No. 626,316. Patented June 6, 1899.

A. WOOD.

SEWING MACHINE.

(Application filed Nov. 1, 1897.)

(No Model.) 9 Sheets—Sheet 1.

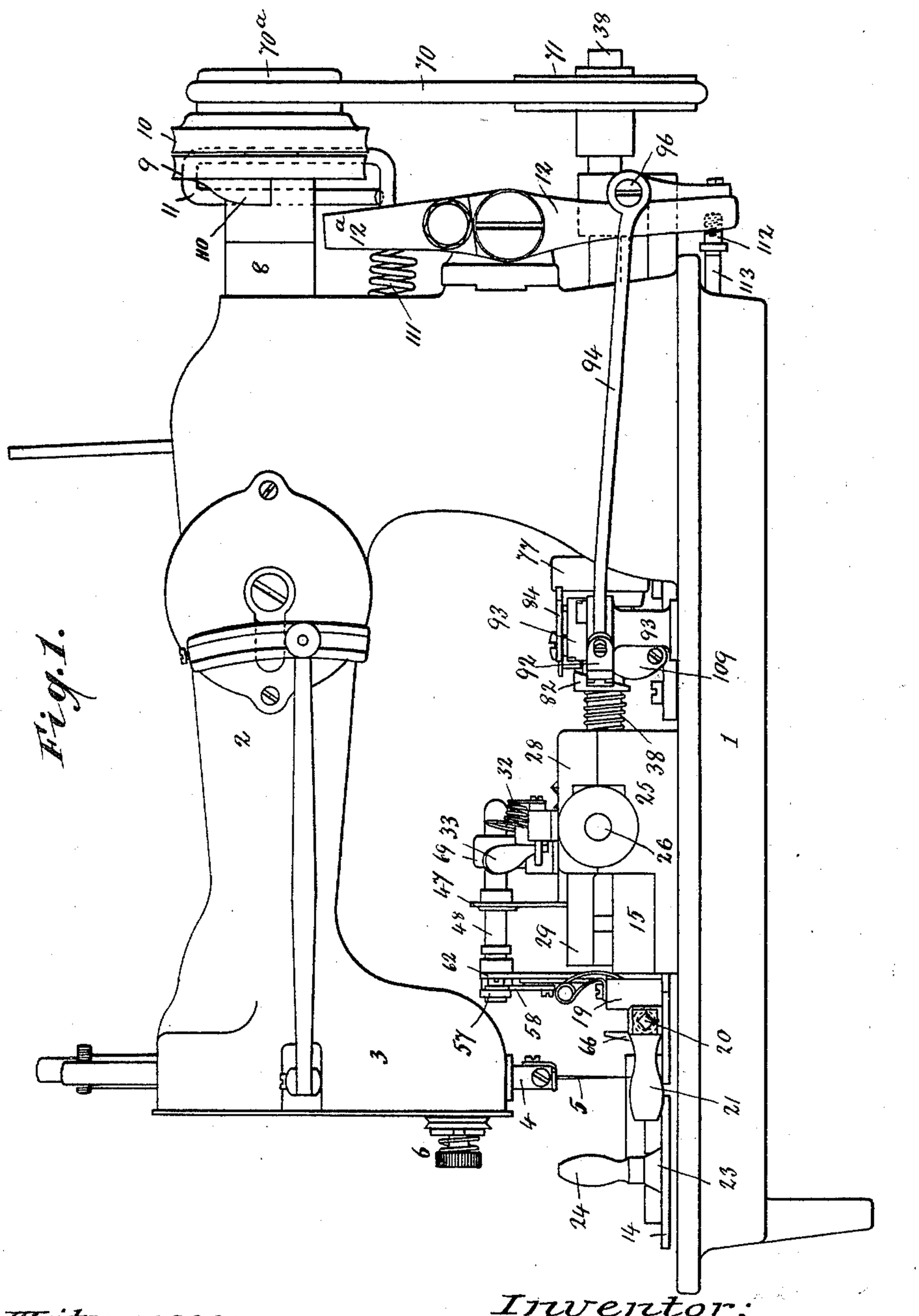

Fig. 1.

Witnesses:
E. P. Bolton
Otto Munn

Inventor:
Alexander Wood
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(No Model.) 9 Sheets—Sheet 2.

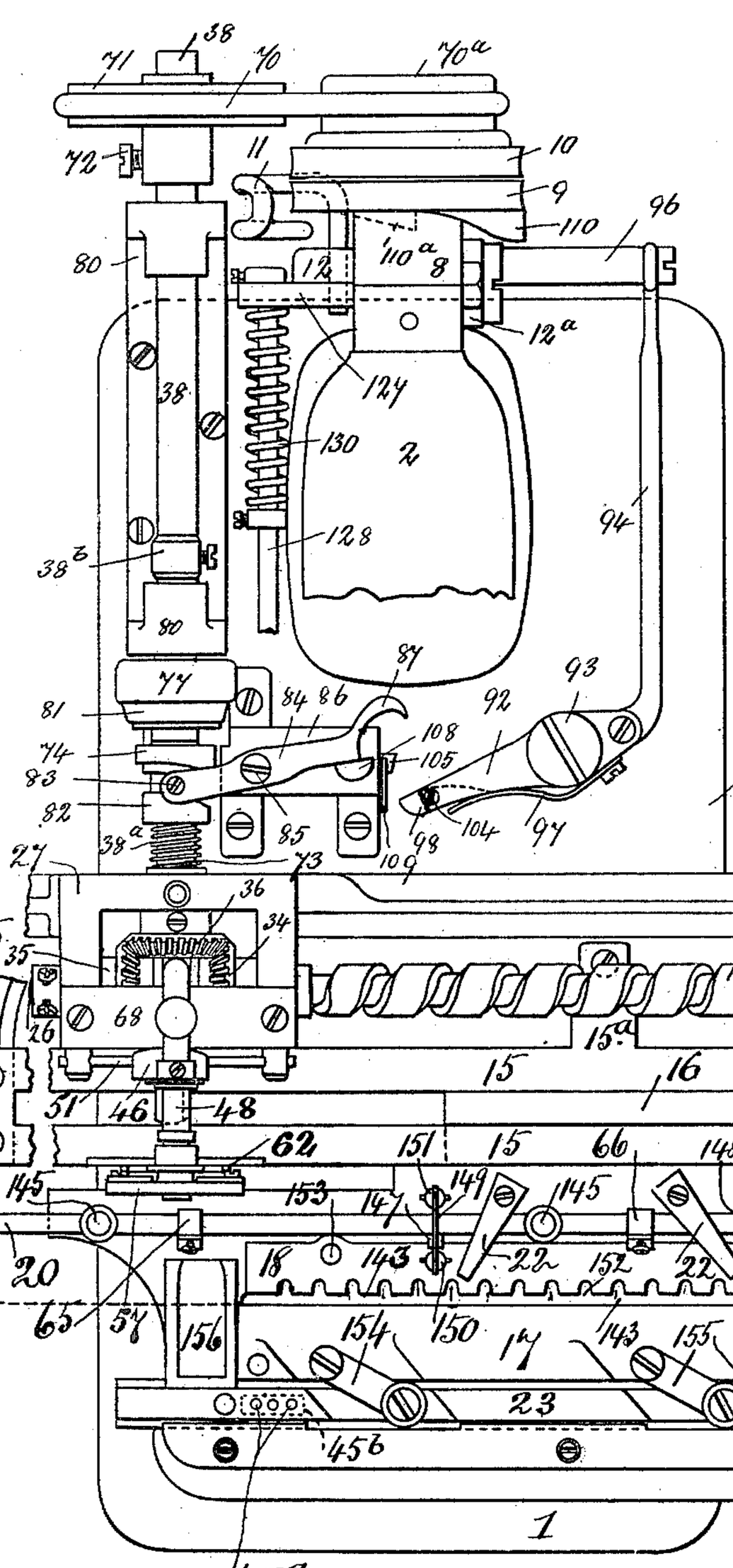

Fig. 2.

Witnesses:

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No. 626,316.

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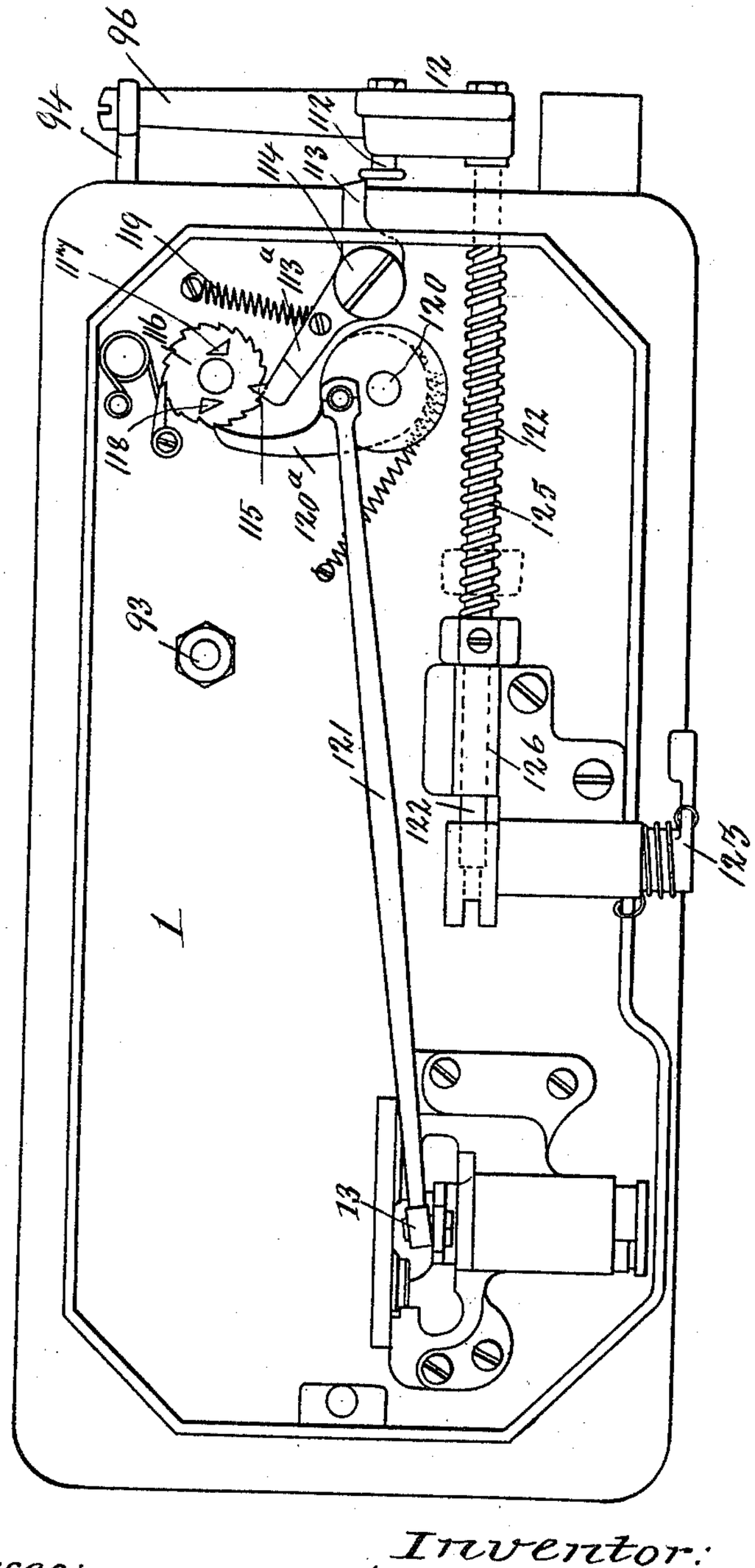
(No Model.)

9 Sheets—Sheet 3.

Fig. 3.



Witnesses:

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A. WOOD.

SEWING MACHINE.

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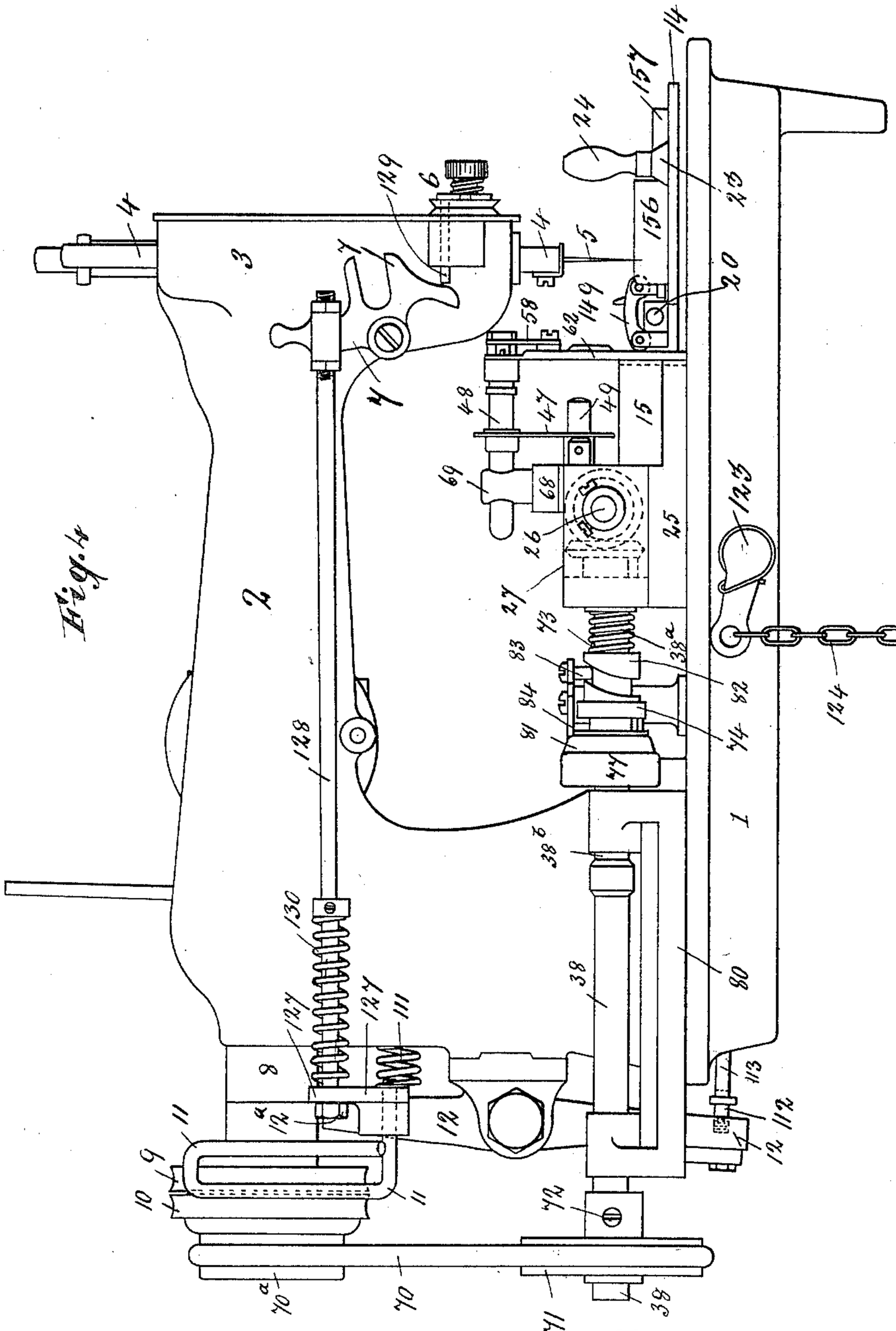
(No Model.) 9 Sheets—Sheet 4.

Fig. 4.



Witnesses:

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SEWING MACHINE.

(Application filed Nov. 1, 1897.)

(No Model.) 9 Sheets—Sheet 5.

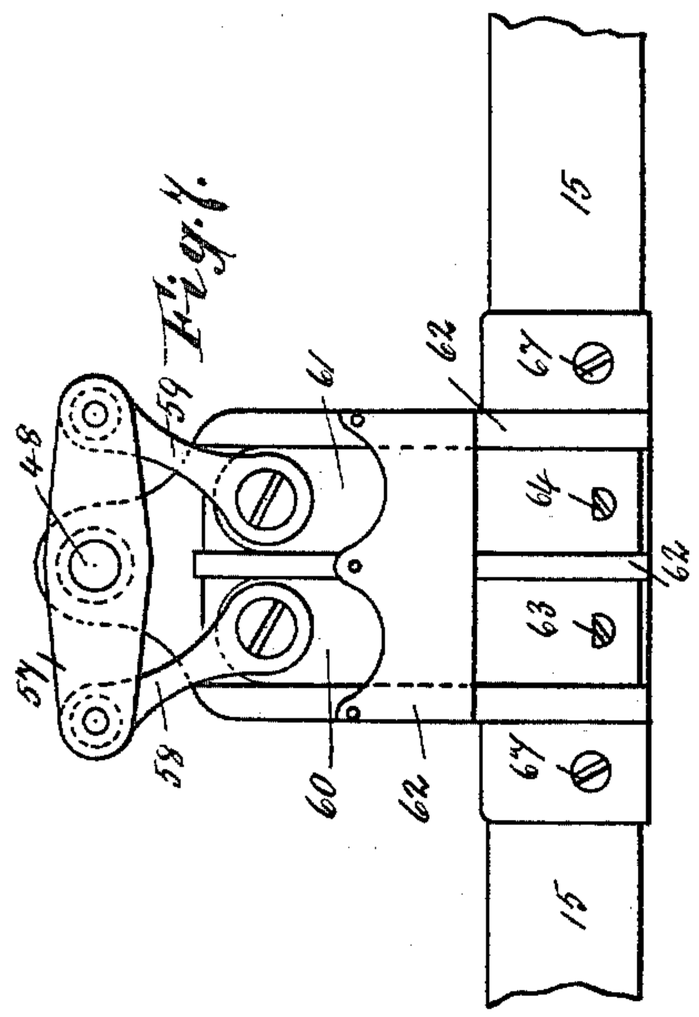

Fig. 4.

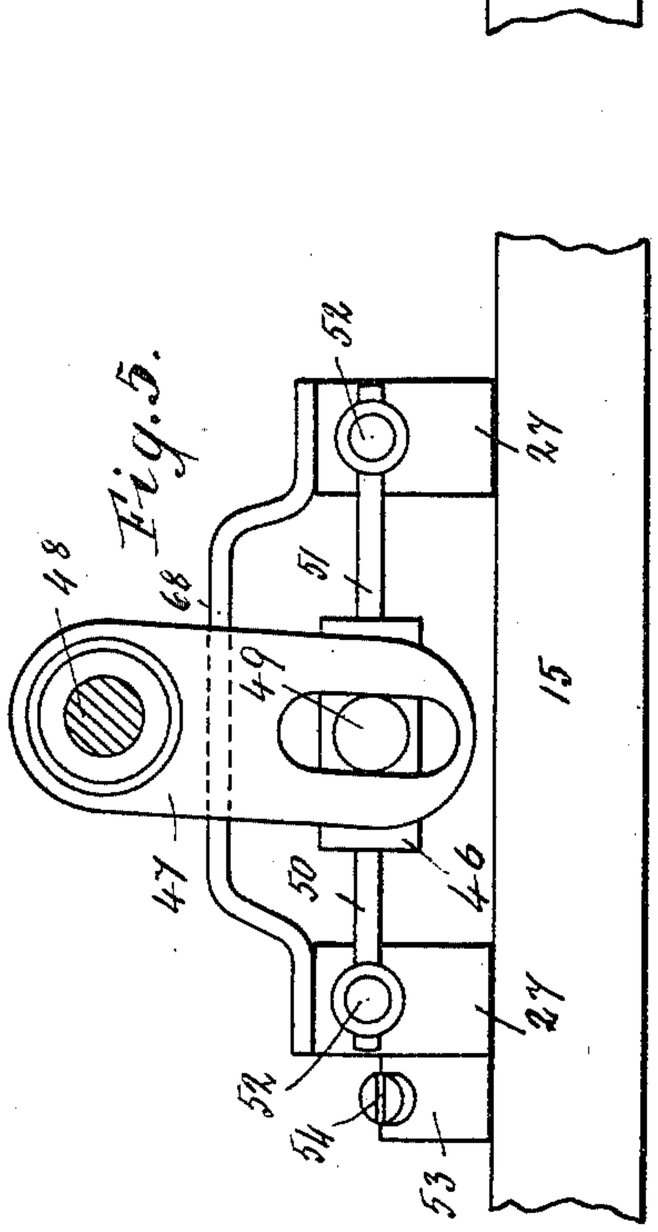

Fig. 5.

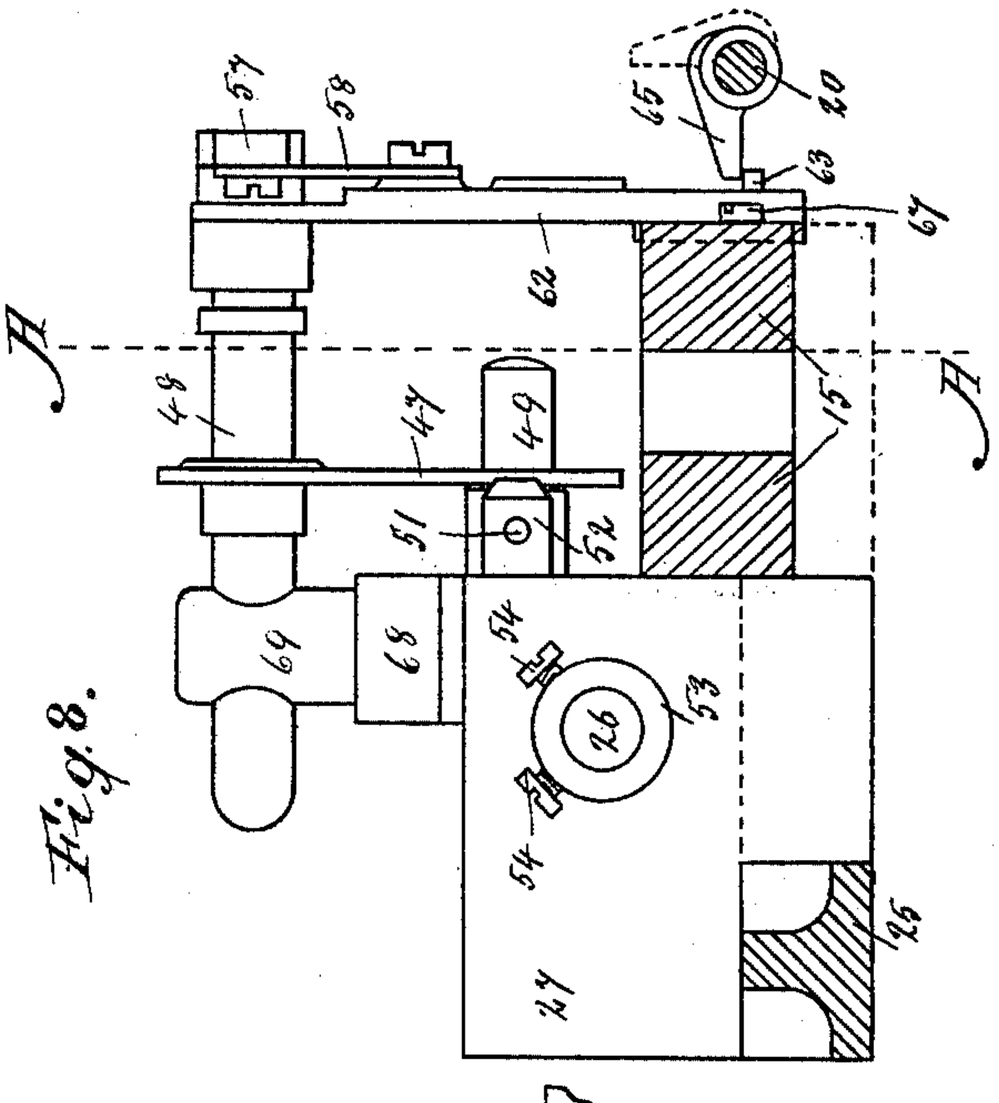

Fig. 8.

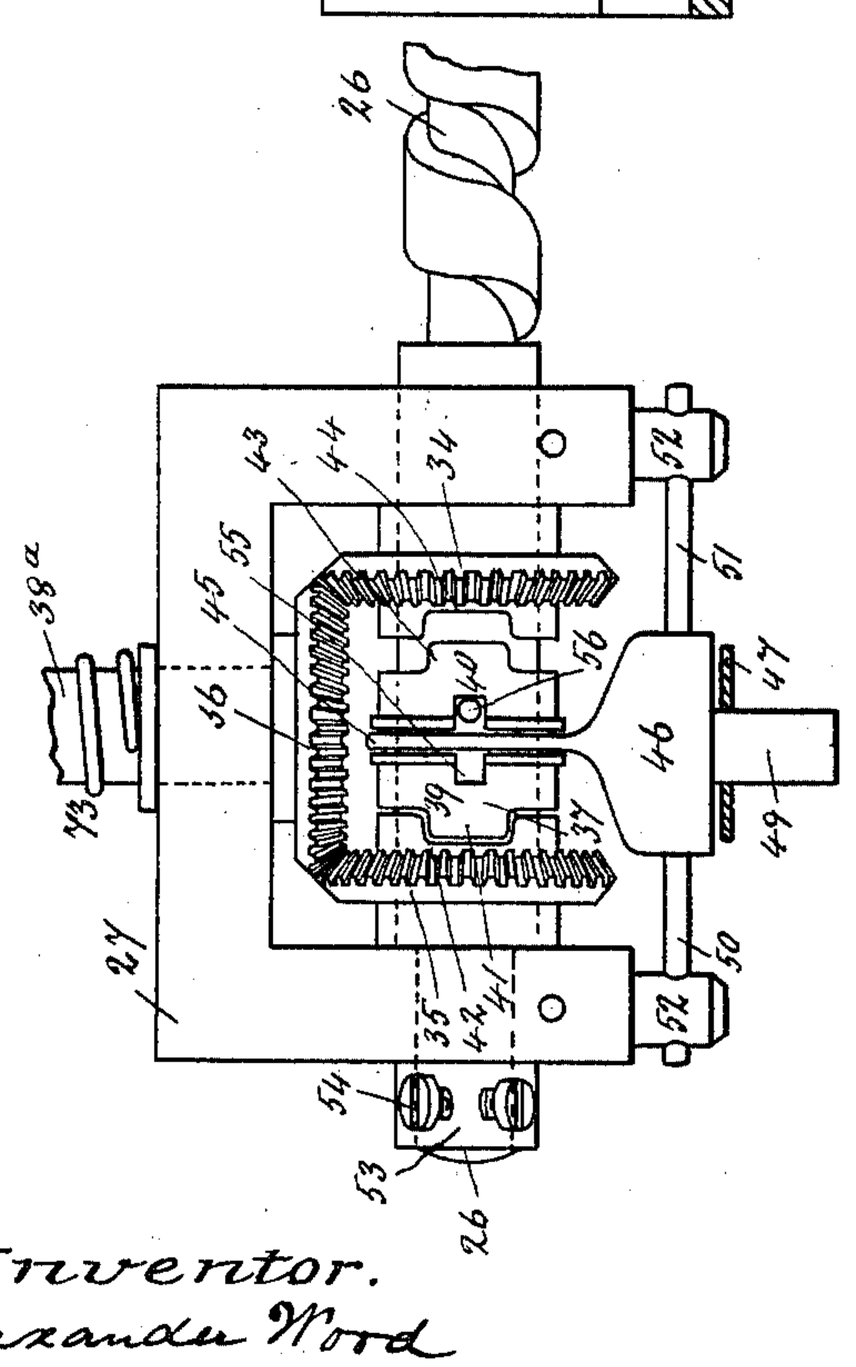

Fig. 6.

Witnesses:
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Patented June 6, 1899.

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SEWING MACHINE.

(Application filed Nov. 1, 1897.)

(No Model.)

9 Sheets—Sheet 6.

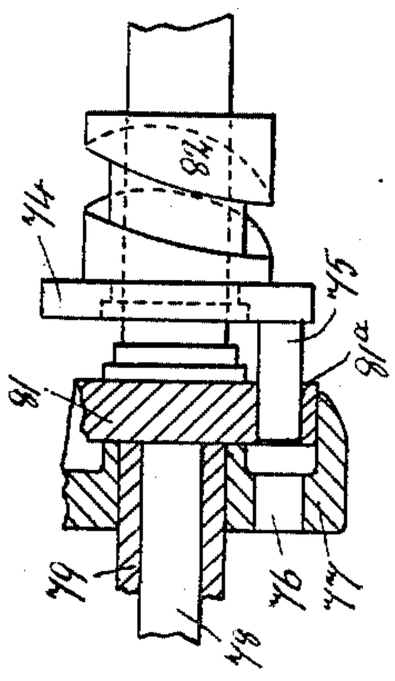

Fig. 9a.

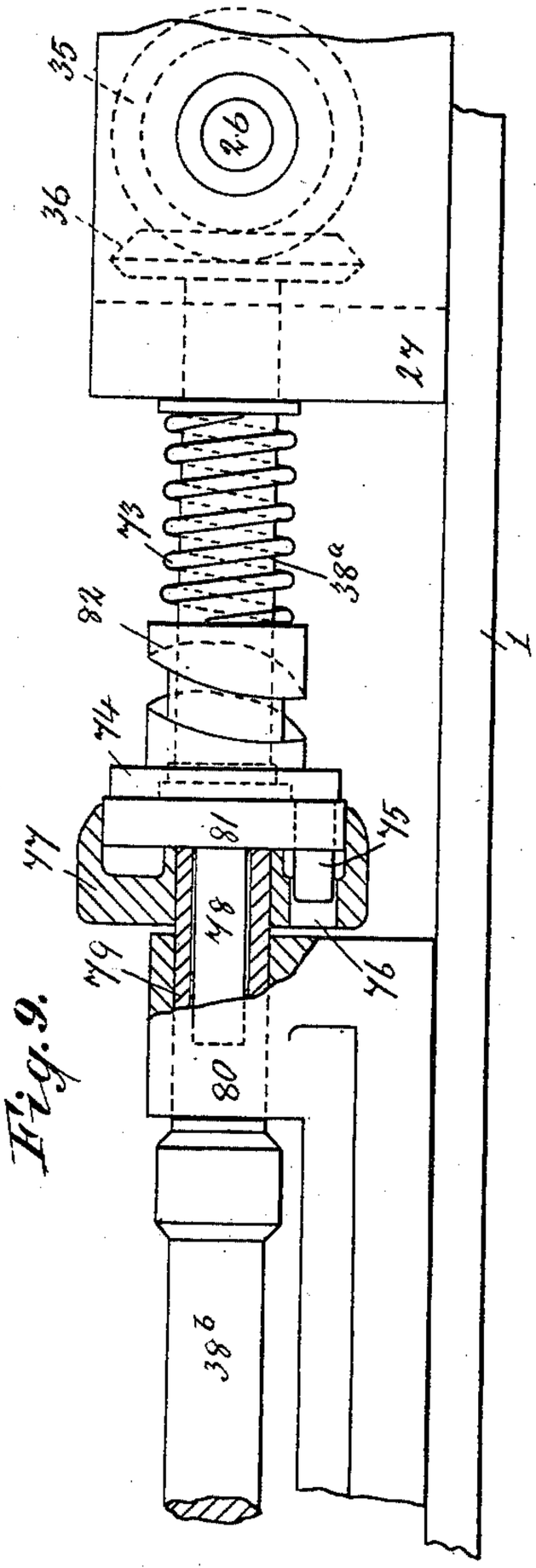

Fig. 9.

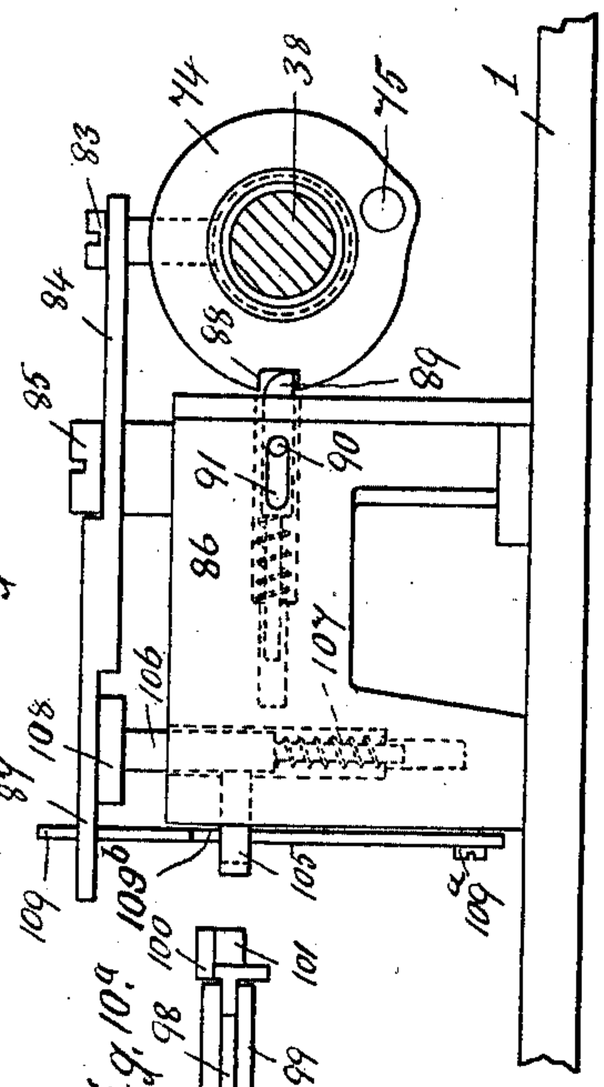

Fig. 10.

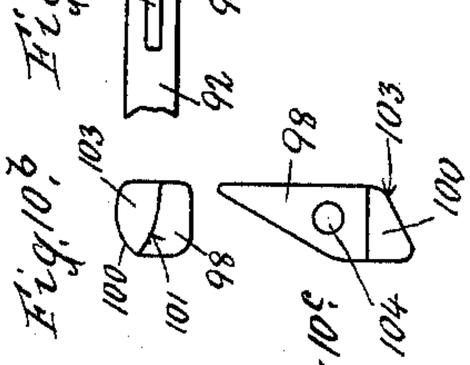

Fig. 10a.

Fig. 10b.

Fig. 10c.

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No. 626,316. Patented June 6, 1899.

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SEWING MACHINE.

(Application filed Nov. 1, 1897.)

(No Model.) 9 Sheets—Sheet 7.

Fig. 14.

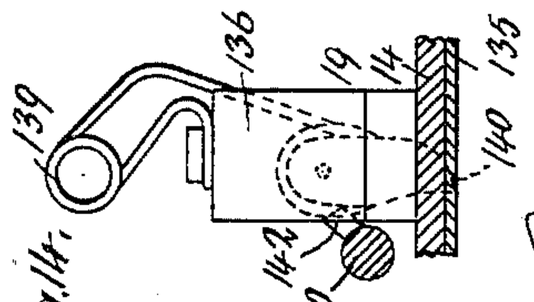


Fig. 13.

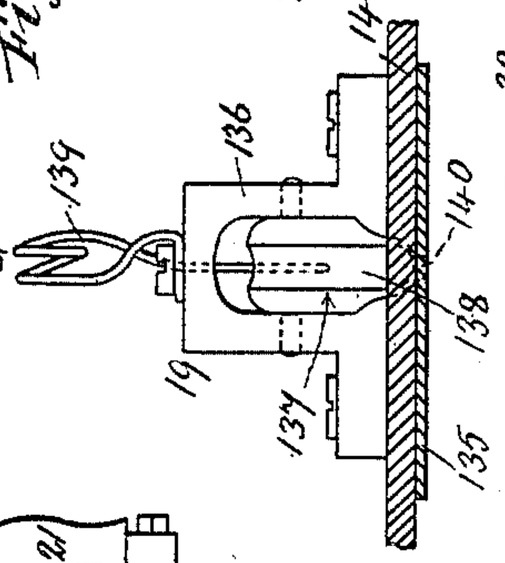


Fig. 16.

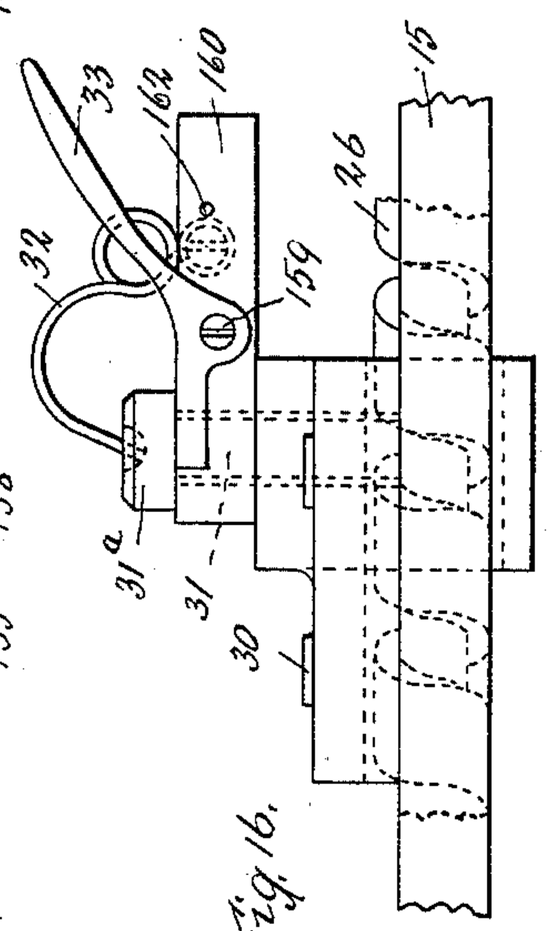


Fig. 17.

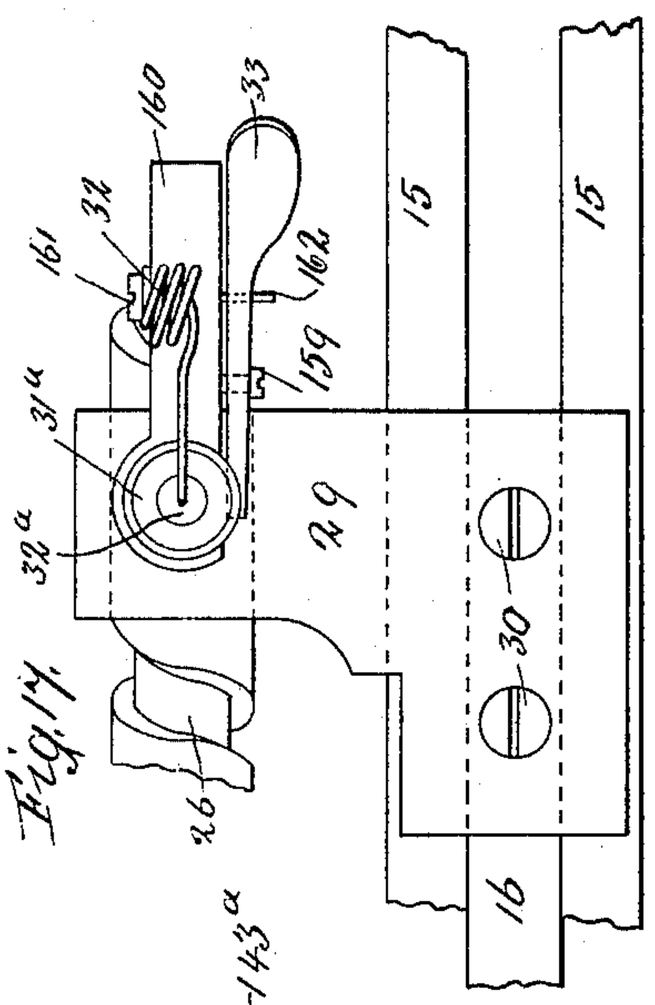


Fig. 12.

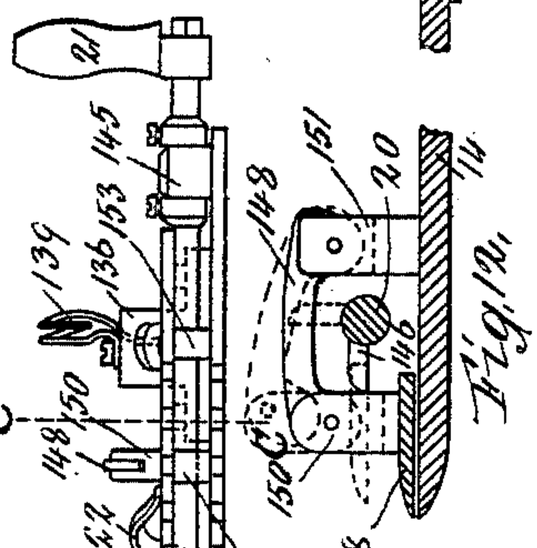
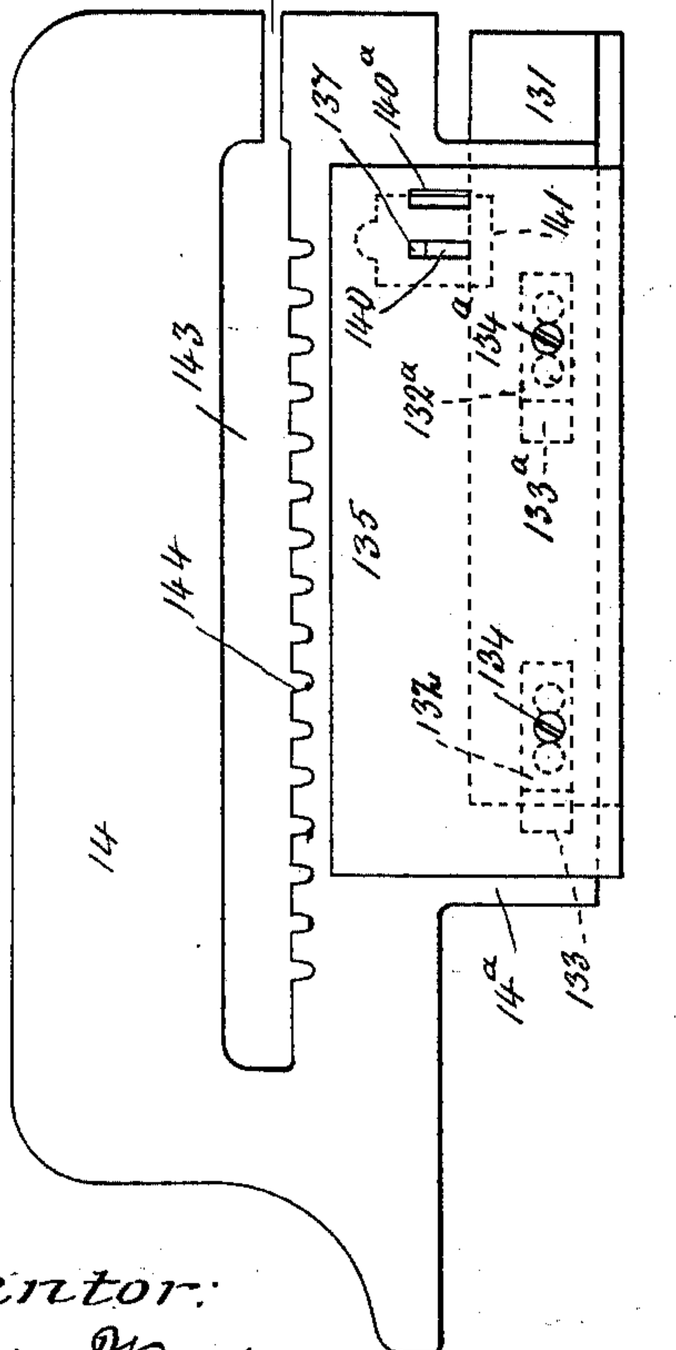


Fig. 11.

Fig. 15.

Fig. 18.



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No. 626,316.

Patented June 6, 1899.

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SEWING MACHINE.

(Application filed Nov. 1, 1897.)

(No Model.)

9 Sheets—Sheet 8.

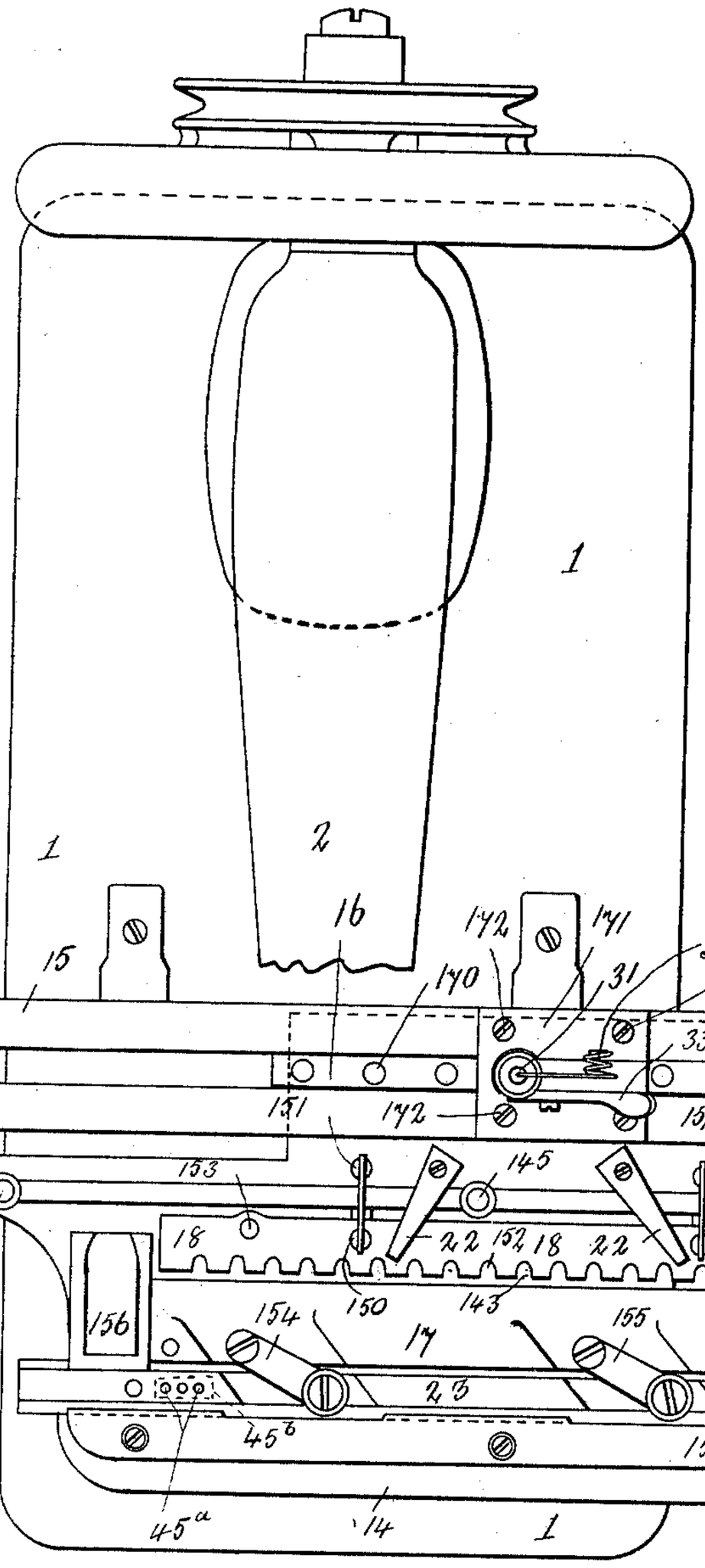

Fig. 19.

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No. 626,316. Patented June 6, 1899.

A. WOOD.

SEWING MACHINE.

(Application filed Nov. 1, 1897.)

(No Model.) 9 Sheets—Sheet 9.

Fig. 20.

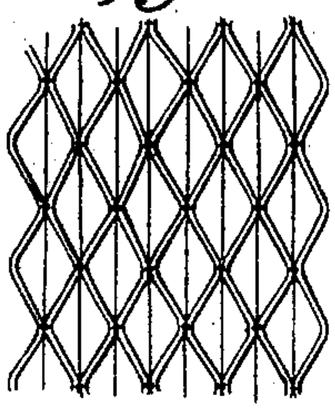
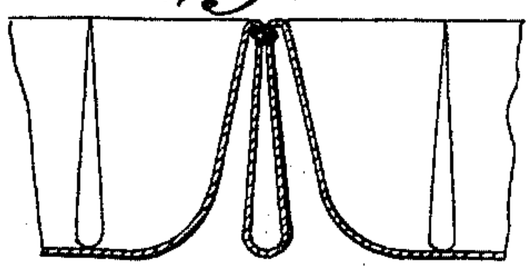


Fig. 21.

Fig. 22.



Attest,
Walter Donaldson
Wm. F. Ddell

Inventor
Alexander Wood
by Richards & Co.
Attys.

UNITED STATES PATENT OFFICE.

ALEXANDER WOOD, OF GLASGOW, SCOTLAND, ASSIGNOR TO THE ARTHUR & COMPANY, LIMITED, OF SAME PLACE.

SEWING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 626,316, dated June 6, 1899.

Application filed November 1, 1897. Serial No. 657,057. (No model.)

To all whom it may concern:

Be it known that I, ALEXANDER WOOD, mechanic, a subject of the Queen of Great Britain, and a resident of the city of Glasgow, Scotland, have invented certain new and useful Improvements in Sewing-Machines for Doing Smocking, Waffling, or Honeycombing-Work, of which the following is a specification.

This invention relates to sewing-machines; and it has for its object to provide a mechanical attachment for doing smocking, waffling, or honeycombing-work such as is at present made by hand on fabrics; and in order that my said invention may be properly understood I have hereunto appended nine explanatory sheets of drawings which show, merely by way of example, a convenient method of carrying the invention into effect or practice.

The invention has been patented in Switzerland, No. 15,571, dated October 21, 1897.

On the drawings, Figure 1 is a side view of an ordinary Singer zigzag-stitch machine, with the honeycombing attachment fitted thereto. A machine of the Singer type has merely been chosen by way of example. Fig. 2 is a plan view of the machine with the attachment. The head and the greater part of the arm of the sewing-machine are broken away in order to show the attachment clearly. Fig. 3 is an inverted plan showing mechanism at the under side of the bed-plate. Fig. 4 is an opposite side view from that in Fig. 1. Fig. 5 is a section taken on the line A A, Fig. 8. Fig. 6 is a plan, Fig. 7 is a front view, and Fig. 8 is a side view, all drawn to an enlarged scale, of the bevel-gear reversing mechanism. Fig. 9 is an enlarged side view, partly sectioned, showing the clutch 74 77 in gear; and Fig. 9[a] is a similar view showing the clutch out of gear. Fig. 10 is an enlarged side view of the feed-regulating device. Fig. 10[a] is a front view, Fig. 10[b] a side view, and Fig. 10[c] a plan, of the tooth 98. Fig. 11 is an enlarged sectional view taken on the line B B, Fig. 2, and showing the locking strip or clamp 18 in front view. Fig. 12 is a cross-section on the line C C, Fig. 11. Fig. 13 is a front view, and Fig. 14 a side view, to an enlarged scale, of the spring-pawl locking device 19. Fig. 15 is a cross-section, to an enlarged scale, taken on the line D D, Fig. 2. Fig. 16 is an enlarged side view, and Fig. 17 an enlarged plan view, of the spring-locking-pin device. Fig. 18 is an inverted plan of the frame 14 and the mechanism connected therewith. Fig. 19 shows a modification of the attachment. Fig. 20 is a plan, and Fig. 21 a section, of a piece of honeycomb fabric as made by the machine. Fig. 22 is a section, to an enlarged scale, showing the plaits and the method of tacking them together.

Referring to the drawings, whereon the same reference-numerals wherever repeated indicate the same or similar parts, 1 is the bed-plate, 2 the arm, 3 the head, 4 the needle-bar, 5 the needle, 6 the tension, 8 the horizontal driving-shaft, 9 10 the fast and loose power-pulleys, 11 the driving-strap or belt-shifting fork, and 13 the shuttle mechanism, of an ordinary Singer zigzag-stitch machine.

The parts for automatically stopping the sewing mechanism after the completion of the proper number of stitches at each tack, for regulating the number of stitches at each tack, for varying the tension, and for throwing the stopping mechanism out of gear are the same as the parts used on Singer machines for the same purposes. The parts consist of the stop-lever 12, its spring 111, its adjusting-screw 112, the stops 110 110[a] on the fast pulley 9, the two-armed trip-lever 113 113[a], with its spring 119, the stitch-regulating ratchet-wheel 116, the trips 117 118 on the ratchet-wheel, the starting-rod 122, with its spiral spring 125, the starting-rod bracket 126, the starting crank-shaft 123, with its chain 124 connected with a treadle, (not shown,) the tension-connecting rod 128, with its spring 130, the bell-crank 7, and the tension-pin 129. As usual, the fork 11 is secured to a bracket 127, attached to the upper end 12[a] of the stop-lever, and the connecting-rod 128 is also attached to this bracket. 120 is the vertical shaft of the machine. 121 is the usual connecting-rod for the shuttle mechanism 13. 120[a] is the eccentric-pawl for turning the stitch-wheel 116.

This invention consists in a mechanical attachment for sewing-machines whereby what

is known as "honeycomb-work" such as is at present done by hand can be performed on the machine.

The features of novelty constituting the invention are pointed out in the claims at the end of this specification.

Under this invention there is secured to the bed-plate 1 of the sewing-machine guides 15, (attached by lugs 15ª to the bed-plate,) in which slides a bar 16. The guides 15 are strengthened by a cast stay or bracket 25, secured to the bed-plate. Attached to the under side of the bar 16 is a strip 131, (see particularly Figs. 15 and 18,) having downwardly-projecting oblong pieces 132 132ª attached to it. These oblong pieces pass through slots 133 133ª cut in the rear part 14ª of the sliding frame 14. Secured by means of screws 134 134ª to the pieces 132 132ª is a lower guide-plate 135. It will thus be seen that the strip 131 and plate 135 together form guides between which the frame 14 can move to an extent permitted by the working of the pieces 132 132ª in the slots 133 133ª. The slots and pieces are clearly indicated in dotted lines in the inverted plan Fig. 18. For the purpose of locking the frame 14 in position when moved the spring-pawl locking device 19 (shown more particularly at Figs. 13 and 14) is attached to said frame. This device consists of a block 136, secured to the upper side of the sliding frame 14. Pinned in the block is a pawl 137, which has a grooved face 138. (See Fig. 13.) The pawl is normally pressed forward by the spring 139, and when it is so pressed forward it projects down into and locks in either one or other of the slots 140 140ª cut in the plate 135. A hole 141, as indicated in dotted lines at Fig. 18 and also in full lines at Fig. 15, is cut out of the frame 14 for the passage of the pawl. In Fig. 18 the point of the pawl 137 is shown as locked in the slot 140. The pawl is manipulated so as to raise it up out of the slot (140 or 140ª) with which it may for the time being be engaged by means of a tappet 142 on the rocking spindle 20. This tappet when the spindle 20 is turned sufficiently forces the pawl out of engagement with the slot 140 or 140ª, as the case may be.

The sliding frame 14, which is cut out longitudinally at 143, is provided with a row of teeth or nicks 144 (or their equivalent) along one edge of the cut-out part. As will be seen more particularly at Figs. 2 and 18, the cut-out part has a narrow gate or passage 143ª.

The rocking spindle 20, which is passed through bearing-pins 145, secured to the frame 14, has two projections or tappets 146 147 on it, which when the rocking spindle is partially turned are capable of bearing against the lower side of bridge-links 148 149 and raising them up in the manner indicated in dotted lines at Fig. 12. Each bridge-link is at one end pivotally attached to a stud 150, (see Figs. 2, 11, and 12,) secured to a locking strip or clamp 18, and at the other end is fulcrumed in a stud 151, secured to the frame 14. The locking-strip, which has teeth or nicks 152 in it corresponding exactly to the teeth or nicks 144 of the sliding frame, is normally pressed downward against the said frame by means of springs 22 and is capable of being raised up, along with the link-bridges 148 149, by means of the projections or tappets 146 147 of the rocking spindle. In order to guide the locking-strip in its movements, pins 153 are secured to the frame 14, and these pins pass up through holes in the locking-strip, as shown.

The spindle 20 can be rocked by means of a handle 21.

Fitted also on the sliding frame is a plaiting knife or blade 17, to which a lateral movement (on the principle of the parallel-ruler) can be imparted by means of a slide 23 and links 154 155. The slide 23, which is provided with a suitable handle 24, works in guides 156 157, secured to the frame 14. For the purpose of regulating the extent of movement of the slide a pin can be passed through any one of the holes 45ª in the slide and made to catch in a slot 45ᵇ (shown in dotted lines) in the frame 14. The left-hand guide 156, Fig. 2, also serves to strengthen its end of the frame 14.

The frame 14 and slide 16 connected therewith are traversed backward and forward by means of a screwed spindle 26, whose ends pass through the bearing-blocks 27 28, secured to the bracket 25. The screwed spindle also passes freely through a hole in an adjusting-block 29, attached by means of screws 30 to the slide 16. The adjusting-block is provided with means for locking it in any desired position on the screw 26, which I term the "feed-screw." The spring locking-pin device, which is shown at Figs. 16 and 17 in side and plan views to an enlarged scale, consists of a thumb-lever 33, which is fulcrumed at 159 to the rib 160. This lever bears at its forward end against the under side of the head 31ª of the locking-pin 31, which latter passes down through a hole in the block and enters that convolution of the feed-screw 26 which is for the time being under it. The pin 31 is pressed down by means of a spring 32, which bears at one end in a depression 32ª, made in the head 31ª, and at the other end is secured to a screw 161, screwed into the rib 160. 162 is a stop-pin to limit the downward movement of the thumb-lever 33. The pin 31 is normally held down or locked with its point in the groove of the screw by means of the spring 32, and it can be raised up out of contact with the screw or unlocked by depressing the thumb-lever 33. When the pin is raised up out of contact with the screw, the adjusting-block 29 can be slid along the screw and the slide 16 and frame 14 be moved with it; but when the pin is locked in the groove of the screw the frame is locked firmly and cannot be traversed apart from the movement of the feed-screw. The space between any two of the convolutions of the screw is

equal to the free space or step made between the stitches when honeycombing.

The feed-screw 26 is driven from a counter-shaft 38, having a pulley 71, which is rotated by a belt 70, running on an additional pulley 70ª, attached to the loose pulley 10 of the machine-shaft 8. The shaft 38 is carried in a bearing-bracket 80. When the feed-screw is rotated in one direction, it, owing to the pin 31 working in the thread of the feed-screw, traverses the frame in one direction, and when it is rotated in an opposite direction it reverses the movement of the frame.

In order to reverse the direction of rotation of the feed-screw 26, and consequently the traverse of the frame, a bevel-gear reversing-motion, such as shown at Figs. 5, 6, 7, and 8, can be used. This motion consists of an arrangement of three bevel-wheels, two, 34 35, of which are fitted to sleeves working loosely on the end of the feed-screw spindle 26, while the third, 36, is rigidly attached to the end 38ª of the counter-shaft 38. Either the bevel-wheel 34 or 35 can be thrown into gear with the feed-screw 26 by means of the sliding clutch 37. This clutch consists of a metal ring 39 40, which is capable of being slid backward and forward on the feed-screw spindle 26, so that either the tooth 41 locks in the corresponding recess 42 of the sleeve of the wheel 35 or the tooth 43 locks in the recess 44 of the sleeve of the wheel 34 by the action of a fork 45 whose ends catch in a groove in the clutch 37 and which is attached to a slide 46, operated by a slotted arm 47, attached to the rocking shaft 48. (See also Fig. 8.) A pin 49 on the slide 46 projects outwardly through the slot in the arm 47.

50 51 is the slide-bar upon which the slide 46 moves. The bar is fitted in snugs 52, secured to the block 27.

53 is a collar secured to the feed-screw spindle 26 by screws 54. 55 is a guide-slot in the clutch 37, and 56 is a guide-pin fitted in the feed-screw spindle 26 and working in said slot.

The shaft 48 is rocked, so as to move the slide 46 and shift the clutch 37, by means of the device shown more particularly at Figs. 7 and 8, which is actuated by the turning of the spindle 20 of the frame 14. The device consists of a cross head or lever 57, secured at its center to the end of the shaft 48, and the ends of this lever are connected by links 58 59 to two slides 60 61, working in a guide-frame 62. At the lower end of the slide 60 is a screw 63 or pin with a flat face or part, while at the lower end of the slide 61 a similar screw or pin 64 is fitted. On the rocking spindle 20 of the frame 14 two or more tappets 65 66 are fitted. The tappet 65 can be made by the turning of the spindle 20 to bear upon and depress the pin 63 and its slide 60 when the frame 14 is at the end of its back traverse, while the tappet 66 can in the same manner be made to bear upon and depress the pin 64 and its slide 61 when the frame 14 is at the end of its forward traverse. When the pin 63 and slide 60 are depressed, the shaft 48 is rocked in one direction, and at the same time the slide 61, with its pin 64, is pulled up. When the pin 64 and slide 61 are depressed, the shaft 48 is rocked in the opposite direction, and at the same time the slide 60, with its pin 63, is pulled up. The tappets are made adjustable upon the spindle 20. The guide-frame 62 is secured to the guides 15 by screws 67.

68 is a bridge-piece for carrying the bearing-pin 69 of the rock-shaft 48.

As it is essential that the frame 14 be fed forward by the feed-screw only one "step" (*i. e.*, the space between two consecutive tacking-stitches) at a time and then stopped during the stitching of the plaits, it is necessary that the feed-screw be stopped at every revolution (every revolution is equal to a forward feed of one step) until the stitching is done and then restarted. To effect this, there is provided an automatic feed-regulating device, which is shown more particularly at Figs. 9, 9ª, 10, 10ª, 10ᵇ, and 10ᶜ. This device works in conjunction with the stop-motion of the machine.

On the shaft 38, which is made, as shown, in two parts 38ª 38ᵇ fitting into each other, the part 38ª having a round male end 78, which enters the socketed female end 79 of the part 38ᵇ, is fitted a clutch 74 77. The box part 77 of the clutch is fitted rigidly on the end 79 of the part 38ᵇ of the shaft, while the sliding part or clutch-piece 74 is fitted loosely on the part 38ª of the shaft and has a coil-spring 73, which tends to press its pin 75 into engagement with the hole 76, made in the box part 77. On the part 38ª is a collar 81, having a hole 81ª, through which the pin 75 passes. The clutch-piece 74 has a grooved cam 82 in conjunction with it. Working in the groove of the cam is a pin 83, Fig. 2, attached to one end of a lever 84, (see also Fig. 10,) whose other end has a tailpiece 87.

The clutch-piece 74 has a recess 88, with which a spring locking-bolt 89, Fig. 10, in the block 86 can engage. The bolt has a guide-pin 90, which works in a slot 91, cut in the block 86.

The clutch-piece 74 is automatically moved into gear with the clutch-box 77 by the action of the spring, and it is moved out of gear once in each revolution of the shaft 38, and also of the feed-screw 26, by the action of the pin 83 of the lever 84, working in the groove of the cam 82. In order that the clutch may only be allowed to enter into gear at the proper times, the regulator (shown at Figs. 1 and 2) is provided. This regulator, which acts in conjunction with the stop-motion, consists of a lever 92, fulcrumed to the bed-plate at 93 and connected by a bar 94 with a lateral pin 96 on the stop-motion lever 12.

97 is a spring bearing against the tooth 98, which is pivoted at 104 in the end jaw 99 of the lever. This tooth has a pointed face formed by the two bevels 100 101. (See Figs. 10ª, 10ᵇ, and 10ᶜ.) The tooth also tapers away toward

the rear, as shown at 103, Figs. 10[b] and 10[c]. Fig. 10[a] shows a front view of the end of the lever 92, while Fig. 10[b] is a side view looking toward the left hand of Fig. 10[a] and showing the pointed end of the tooth, and Fig. 10[c] is a plan of the tooth. The pointed end of the tooth is at certain times capable of bearing against and depressing a pin 105, fitted in a spring-bolt 106, (see Fig. 10,) which works in a hole in the block 86. The pin 105 moves vertically in a slot in the block. The dotted lines at 107 represent the spring of the bolt. The head 108 of the bolt is cut away, as shown at Fig. 2.

109 is a catch pivoted at 109[a] and provided with a projection 109[b], which is capable of catching on and holding down the pin 105.

To do honeycombing-work with the attachment, the fabric is first passed through the gate 143[a] and into the slot 143 of the sliding frame. One end of the fabric, as indicated by the heavy dotted line at Fig. 15, is passed between the frame 14 and the bed-plate 1 of the machine, while the other end, if it is long enough, lies on top of the knife 17. The rocking spindle 20 is now turned by the handle 21, so as to raise up by means of the tappets 146 147 the locking-strip 18 into the position shown in full lines at Figs. 11 and 15. The knife 17 is now moved laterally, so as to force the fabric between the locking-strip 18 and teeth 144 of the frame 14 (in the manner shown at Fig. 15) in order to form a plait by pushing the handle 24 to the left, Fig. 2. The locking-strip 18 is now allowed to descend or close under the action of the springs 22, so as to grasp the fabric by turning back the handle 21 to its original position, and thereafter the knife 17 is withdrawn by merely pulling toward the right, Fig. 2, the slide-handle 24. The now plaited fabric remains in place, being held securely by the spring locking-strip 18, which is closed upon it. The first plait being now made in the fabric, it is necessary to sew the first tacking-stitch, and in order to do this the treadle is depressed and the crank-shaft 123 and starting-rod 122 actuated, so as to force the stop-lever 12 into the position shown at Fig. 1, in which position it is thereafter automatically retained by the trip-lever 113 bearing against the adjusting-screw 112. When the stop-lever is in this position, the fork 11 is shifted so as to throw the driving-belt (not shown) of the machine onto the fast pulley 9, and thus start the sewing mechanism. The sewing mechanism continues in operation until the stitch-wheel 116 moves around half its number of teeth, when the trip—say 117—strikes against the projection 115 of the trip-lever and forces it backward, so as to disengage the end 113 from the stop-lever screw 112, whereupon the stop-lever is immediately moved by the action of the spring 111 and its end 12[a] brought into engagement with the stop 110 of the pulley 9, so as to stop the sewing mechanism. The movement of the lever 12 throws the driving-belt off the pulley 9 onto the loose pulley 10 and at the same time operates the rod 94 and lever 92 and causes the beveled edge 101 of the tooth 98 to strike against and depress the pin 105 of the spring-bolt 106, thereby releasing the lever 84 and allowing the cam 82 and clutch-piece 74 to move laterally on the shaft 38 and bring the pin 75 into engagement with the hole 76 of the clutch-box, thereby securely locking the two parts 38[a] 38[b] of the shaft 38 together.

The parts of the mechanism are so arranged relatively with each other that each tooth in the stitch-wheel 116 represents a stitch. Therefore if there are, as shown, eighteen teeth in the wheel eighteen stitches will be made during a revolution of the stitch-wheel. As there are two trips on the stitch-wheel the sewing mechanism is stopped twice in each revolution of the wheel, so that only nine stitches can be done at a time—that is to say, nine stitches only are made at each tack. This number of stitches has been found to answer very well; but if a smaller or a larger number is desired in each tack in the honeycombing then stitch-wheels with the desired number of teeth can be used to meet the requirements. The stitch-wheels can be easily changed.

With the completion of the half-revolution of the stitch-wheel the first tack in the fabric has been sewed and the sewing mechanism has been brought to a standstill, the stop-lever being moved into engagement with the stop 110 and the driving-belt shifted onto the loose pulley 10. Immediately the driving-belt is shifted onto the loose pulley, however, the shaft 38 is actuated, and through the closed cluch 74 77 and gearing 36 34 (or 35) the feed-screw 26 is revolved, so as to feed the frame forward. During the revolution of the shaft 38 the groove of the cam 82, (which is shaped for the purpose,) working on the pin 83, moves the lever 84 until eventually it assumes the position shown at Fig. 2 and is caught by the head 108 of the spring-bolt 106. The lever 84 is now locked in position, and the further movement of the cam has, owing to the shape of its groove, the effect of causing both the cam and the clutch 74 to move laterally on the part 38[a] of the shaft until eventually when a complete revolution of the shaft 38 has been effected the clutch-pin 75 is drawn right out of the recess 76 of the clutch-box and the clutch mechanism thrown out of gear, whereupon the revolution of the part 38[a] of the shaft 38 is, along with the movement of the feed-screw 26 and of the frame 14, at once stopped. (Fig. 9 shows the parts of the clutch in gear, while Fig. 9[a] shows the parts out of gear.) When a complete revolution of the shaft 38 and the feed-screw has been effected, the frame 14 has been moved forward exactly the proper distance for sewing the next tack in the plait. The stop-lever is now again, in the manner before described, thrown out of gear with the stop 110 and the sewing mechanism again started, so as to sew the second tack

with the required number of stitches. When the stitches have been completed, the sewing mechanism is again stopped by the action of the stitch-wheel and the feed mechanism thrown into gear, so as to feed forward the frame the space necessary for the third tack, and so on.

When the stop-lever is thrown out of engagement with the stop 110, its movement causes the lever 92 to swing backward into the position shown at Fig. 2. In its swing the beveled back part 103 of the tooth strikes against the pin 105, and as a result the tooth (turning on its pivot 104) yields to an extent sufficient to permit of its point overriding the pin 105.

It is to be noted that the plaited fabric is only sewed through at every second or alternate nick of the locking-strip 18, and the feed-screw is made so that the space between each of its convolutions is equal to the space between the alternate nicks.

When a plait has been sewed in the manner before described, the locking-strip 18 and plaiting-knife 17 are manipulated so as to form a fresh plait in the fabric. This second plait is formed by drawing the fabric (shown in dotted lines) up through the slot between the knife and the locking-strip 18 until there is sufficient material to form another plait adjacent to and parallel with the plait already formed. The operation before described is now performed to form this plait, consisting in moving the knife 17 laterally, allowing the strip 18 to descend and withdrawing the knife to allow the fabric to be held by the clamp. The frame 14 is then by the reversal of the feed-screw traversed backward and the second plait sewed through in the same manner as before, but at the alternate nicks—that is, the nicks missed in the first traverse of the frame. Any number of plaits can be made and sewed in the same manner.

In order to bring about at each traverse of the frame the proper relation between the slide 16 and the nicks of the frame 14 and strip 18, so as to insure that the machine will sew through alternate nicks—that is to say, will sew through the first, third, fifth, &c., nicks at one traverse and then the second, fourth, sixth, &c., nicks at the next traverse—the frame 14 requires to be moved half the space between two tacking-stitches, and this is done by first disengaging the pawl 137 from its slot (say 140) and then pushing or pulling the frame to the limit allowed by the slots 133 133^a, so as to bring the other slot 140^a below the pawl 137, whereupon the pawl is released by turning the spindle 20 and enters into engagement with the other slot 140^a, and thereby locks the frame and slide together in the proper position. The pawl 137 requires to be locked in the slot 140 at one traverse and in the slot 140^a at the next traverse, then in the slot 140 again at the third traverse, and so on, the frame being shifted half the step or space between two stitches at each traverse.

The bolt 89 locks the clutch-piece 74 in position.

When necessary, the catch 109 can be moved so as to hold the pin 105 in the depressed position and retain the head 108 of the bolt clear of the lever 84.

In the modification shown at Fig. 19 the frame, instead of being traversed backward and forward under the needle by the feed-screw mechanism, (shown at Fig. 2,) is arranged so as to be traversed by hand. In this case the slide 16, connected to the frame, has a series of holes 170 in it. These holes are spaced at a distance apart from each other equal to the spaces between the alternate nicks of the locking-strip 18. The locking-pin device, consisting of the locking-pin 31, spring 32, thumb-lever 33, &c., is precisely the same as before, with the exception that it is secured to a block 171, fastened rigidly to the slides 15 by means of screws 172. With this arrangement the frame is merely pushed forward by hand the desired distance at each step and then locked in position by allowing the pin 31 to enter one of the holes 170 of the slide 16. At each feed movement of the frame the pin 31 is disengaged from the bar 16 by depressing the thumb-lever 33.

The details of construction of the attachment can be altered or modified without departing from the principle of the invention.

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

1. In combination in a sewing-machine for doing honeycombing-work, the sewing mechanism for making rows of stitches, holding means for the material which can be laterally shifted in relation to the needle while maintaining substantially a uniform distance therefrom to space the stitches of one row in intermediate relation to those of the preceding row, and means for regulating this lateral shifting movement to one-half the space between two consecutive tacking-stitches.

2. In combination in a sewing-machine for doing honeycombing-work, the sewing mechanism for making rows of stitches, holding means for the material which can be laterally shifted in relation to the needle while maintaining substantially a uniform distance therefrom to space the stitches of one row in intermediate relation to those of the preceding row, means for giving the holding means this lateral shifting movement, and means for regulating this lateral shifting movement to one-half the space between two consecutive tacking-stitches.

3. In combination in a machine for doing honeycombing-work, the sewing mechanism, means for holding the material in plaited form, means for traversing the material while so held under the sewing mechanism in either direction to make lines of stitches and means for securing a relative adjustment between the sewing mechanism and plait-holding means at each end of the line of stitches equal

to one-half of the space between two stitches whereby the stitches of one row will be spaced intermediate of those of the preceding row, substantially as described.

4. In combination, in a sewing-machine, a sewing mechanism, a frame, a clamp having a series of holes, said frame being capable of a step-by-step traversing movement to make a line of stitches through every second hole and for making a second line through the intermediate holes, substantially as described.

5. In combination in a sewing-machine for doing honeycombing-work, sewing mechanism for making rows of stitches and holding means for retaining the material in plaited form, said holding means being capable of a step-by-step movement while maintaining a substantially uniform distance from the sewing mechanism and of an adjustment at the end of each line of stitches equal to one-half the space between two consecutive tacking-stitches so as to space the stitches of one row intermediate of those of the preceding row, substantially as described.

6. In combination in a machine for doing honeycombing-work, the sewing mechanism, means for holding the material in plaited form, and means for traversing the material while so held back and forth under the sewing mechanism with means for permitting the spacing of the stitches of one row intermediate of those of the preceding row, substantially as described.

7. The combination with a sewing-machine of an attachment for doing honeycomb-work comprising a movable frame, a plaiting device secured to the frame, and means for holding the plaits in the proper position while being sewed, the said movable frame being guided to move in a direction longitudinally of the plaiting device, substantially as described.

8. The combination with a sewing-machine of an attachment for doing honeycomb-work comprising a traveling frame, a plaiting device secured to the frame and means for automatically traversing the frame under the needle of the machine, said traveling frame being guided to move in a direction longitudinally of the plaiting device, substantially as described.

9. A honeycombing attachment for sewing-machines having in combination a traveling frame, a plaiting device secured to the frame, means for automatically traversing the frame and means for reversing the direction of the traverse, said traveling frame being guided to move in a direction longitudinally of the plaiting device, substantially as set forth.

10. A honeycombing attachment for sewing-machines having in combination, a traveling frame, a plaiting device secured to the frame, means for automatically traversing the frame in a direction longitudinally of the plaiting device, means for reversing the direction of the traverse of the frame, and means for throwing the traversing mechanism into and out of gear at intervals, substantially as set forth.

11. In a honeycombing attachment for sewing-machines the combination of a frame, a plaiting-knife secured to the frame, means for actuating the plaiting-knfe, a locking-strip adjacent to and coacting with the frame for catching the plaits and means for opening and closing the locking-strip, substantially as set forth.

12. In a honeycombing attachment for sewing-machines the combination of a frame, a plaiting-knife secured to the frame, means for actuating the plaiting-knife, a serrated locking-strip adjacent to and coacting with the frame, for catching the plaits, springs for depressing the locking-strip, and a rock-shaft provided with means for raising the locking-strip, substantially as set forth.

13. In a honeycombing attachment for sewing-machines, a frame working in conjunction with a guiding slide, plait forming and holding means carried by the frame, means for permitting a slight longitudinal movement of the frame independently of the movement of the slide, and means for locking the frame in position when moved, substantially as set forth.

14. In combination the frame 14 means for holding the plait to the frame, the slide 16, working in guides, connected with the frame, a plate 135 secured to the slide, and slots 133, 133^a, and pieces 132, 132^a for allowing a slight relative movement of the frame and the slide, substantially as set forth.

15. In combination, the frame 14 means for holding the plait to the frame, the slide 16, working in guides, connected with the frame, a plate 135 secured to the slide, and slots 133, 133^a and pieces 132, 132^a for allowing a slight relative movement of the frame and the slide and a spring-locking-pawl device for locking the frame in position when moved, substantially as set forth.

16. In combination, the frame 14 means for holding the plait to the frame, the slide 16, working in guides, connected with the frame, a plate 135 secured to the slide, and slots 133, 133^a, and pieces 132, 132^a for allowing a slight relative movement of the frame and the slide, slots 140, 140^a made in the plate, a slot 141 made in the frame, and a spring locking-pawl 137 which is capable of entering into engagement with one or other of the slots 140, 140^a, substantially as set forth.

17. In combination, the traveling frame, the plaiting device, the mechanism for clamping the plaits, the slide connected with the frame, guides for the slide, a screw for traversing the frame, means for actuating the screw, a block attached to the slide, and means for bringing the block into engagement with the screw, substantially as set forth.

18. In combination, the traveling frame, the plaiting device, the mechanism for clamp-

ing the plaits, the slide connected with the frame, guides for the slide, a screw for traversing the frame, means for actuating the screw, a block attached to the slide, a locking-pin fitted in the block, a spring for forcing the locking-pin into engagement with the thread of the screw and a lever for raising it out of engagement with the screw, substantially as set forth.

19. In combination, the traveling frame, the plaiting device, the mechanism for clamping the plaits, the slide connected with the frame, guides for the slide, a screw for traversing the frame, means for actuating the screw, an attachment between the screw and the slide, a clutch for reversing the action of the screw, and means operated by the rock-shaft 20 for actuating the clutch, substantially as set forth.

20. In combination, the traveling frame, the plaiting device, the mechanism for clamping the plaits, the slide connected with the frame, guides for the slide, a screw for traversing the frame, means for actuating the screw, an attachment between the screw and the slide, clutch reversing-gear for the screw, a slide and rock-shaft arrangement for shifting the clutch, and means for actuating this arrangement, substantially as set forth.

21. In combination, the traveling frame, the plaiting device, the mechanism for clamping the plaits, the slide connected with the frame, guides for the slide, a screw for traversing the frame, means for actuating the screw, an attachment between the screw and the slide, clutch reversing-gear for the screw, a slide and rock-shaft arrangement for shifting the clutch, and tappets on the rock-shaft 20 for operating the slides of the arrangement, substantially as set forth.

22. In combination, the sliding frame with its plaiting device thereon, the feed-screw for feeding the frame, the reversing-gear for the feed-screw, and a counter-shaft 38 operated from the loose pulley of the machine for driving the feed-screw, substantially as set forth.

23. In combination, the sliding frame with its plaiting device thereon, the feed-screw for feeding the frame, the reversing-gear for the feed-screw, a counter-shaft for driving the feed-screw, a pulley 71 on the counter-shaft, and a belt passing around the pulley 71 and driven from the loose pulley of the machine, substantially as set forth.

24. In combination, the sliding frame with its plaiting device thereon, the feed-screw for feeding the frame, the reversing-gear for the feed-screw, a shaft made in two parts for driving the feed-screw, means for actuating the shaft, a clutch on the shaft for throwing the two parts into and out of working connection and means for operating the clutch, substantially as set forth.

25. In combination, the sliding frame with its plaiting device thereon, the feed-screw for feeding the frame, the reversing-gear for the feed-screw, a shaft made in two parts for driving the feed-screw, means for actuating the shaft, a clutch-box on one part of the shaft, a clutch-piece on the other part, a grooved cam connected with the clutch-piece, a spring pressing the clutch piece and box into engagement, a pin working in the groove of the cam, and means for altering the position of the pin, substantially as set forth.

26. In combination, the sliding frame with its plaiting device thereon, the feed-screw for feeding the frame, the reversing-gear for the feed-screw, a shaft made in two parts for driving the feed-screw, means for actuating the shaft, a clutch-box on one part of the shaft, a clutch-piece on the other part, a grooved cam connected with the clutch-piece, a spring pressing the clutch piece and box into engagement, a pin attached to a lever, working in the groove of the cam, a spring-pin for locking the lever in position and means for throwing the spring-pin out of engagement with the lever, substantially as set forth.

27. In combination, the sliding frame with its plaiting device thereon, the feed-screw for feeding the frame, the reversing-gear for the feed-screw, a shaft made in two parts for driving the feed-screw, means for actuating the shaft, a clutch-box on one part of the shaft, a clutch-piece on the other part, a grooved cam connected with the clutch-piece, a spring pressing the clutch piece and box into engagement, a pin attached to a lever, working in the groove of the cam, a spring-pin for locking the lever in position, a projection 105 on the spring-pin, and a lever 92 provided with a tooth 98 at its end and connected with the stop-lever of the machine, for depressing the projection 105 and spring-pin thereby releasing the cam-lever, substantially as set forth.

Signed at Glasgow, Scotland, this 28th day of July, A. D. 1897.

ALEXANDER WOOD.

Witnesses:

ASHTON BOSOMWORTH,

WILLIAM FLEMMING.