

No. 875,602.

PATENTED DEC. 31, 1907.

W. N. PARKES.
BUTTONHOLE SEWING MACHINE.

APPLICATION FILED DEC. 17, 1900.

6 SHEETS—SHEET 1.

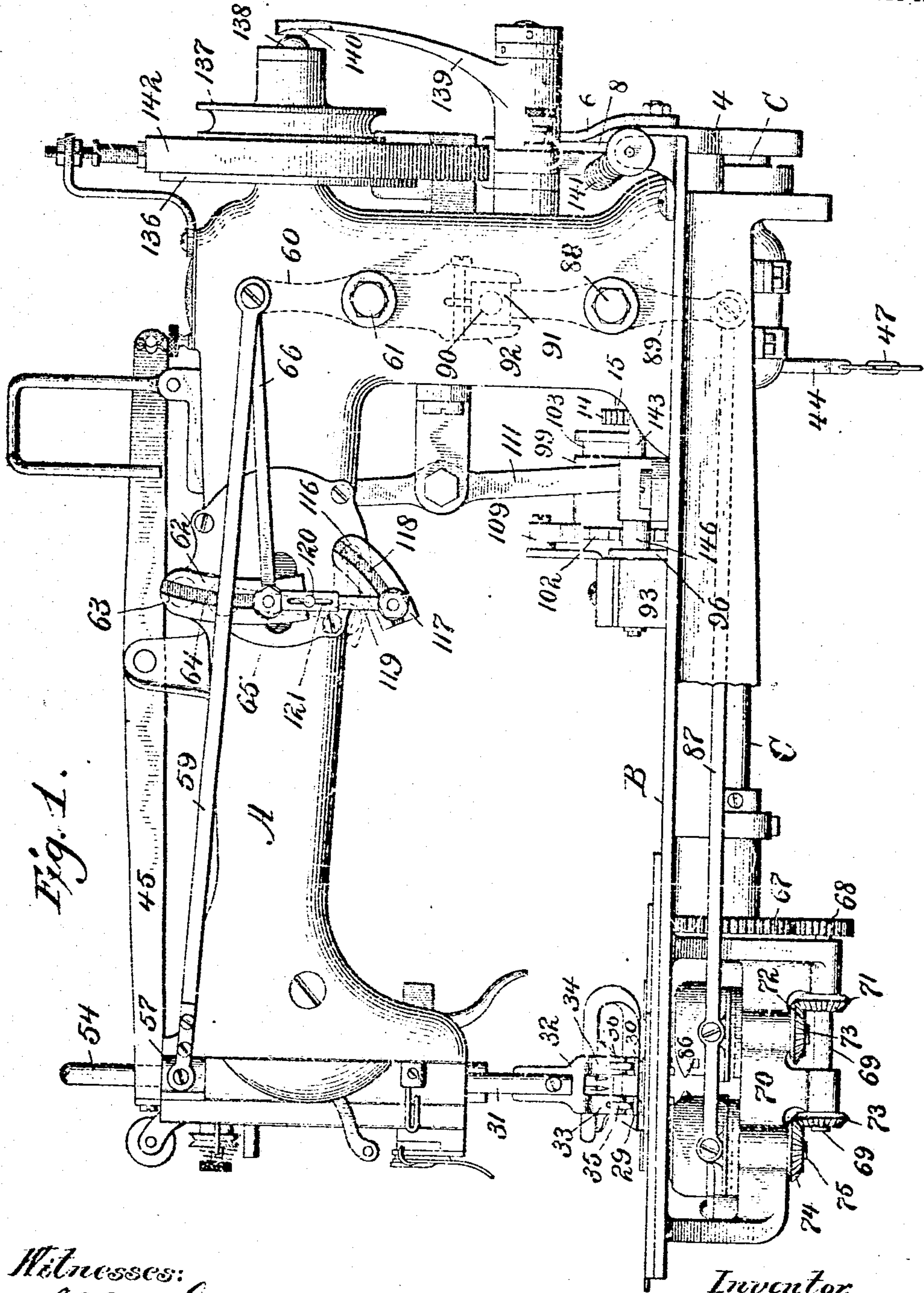


Fig. 1.

Witnesses:
J. R. McGirr.
R. E. Oswell.

Inventor.
William N. Parkes.

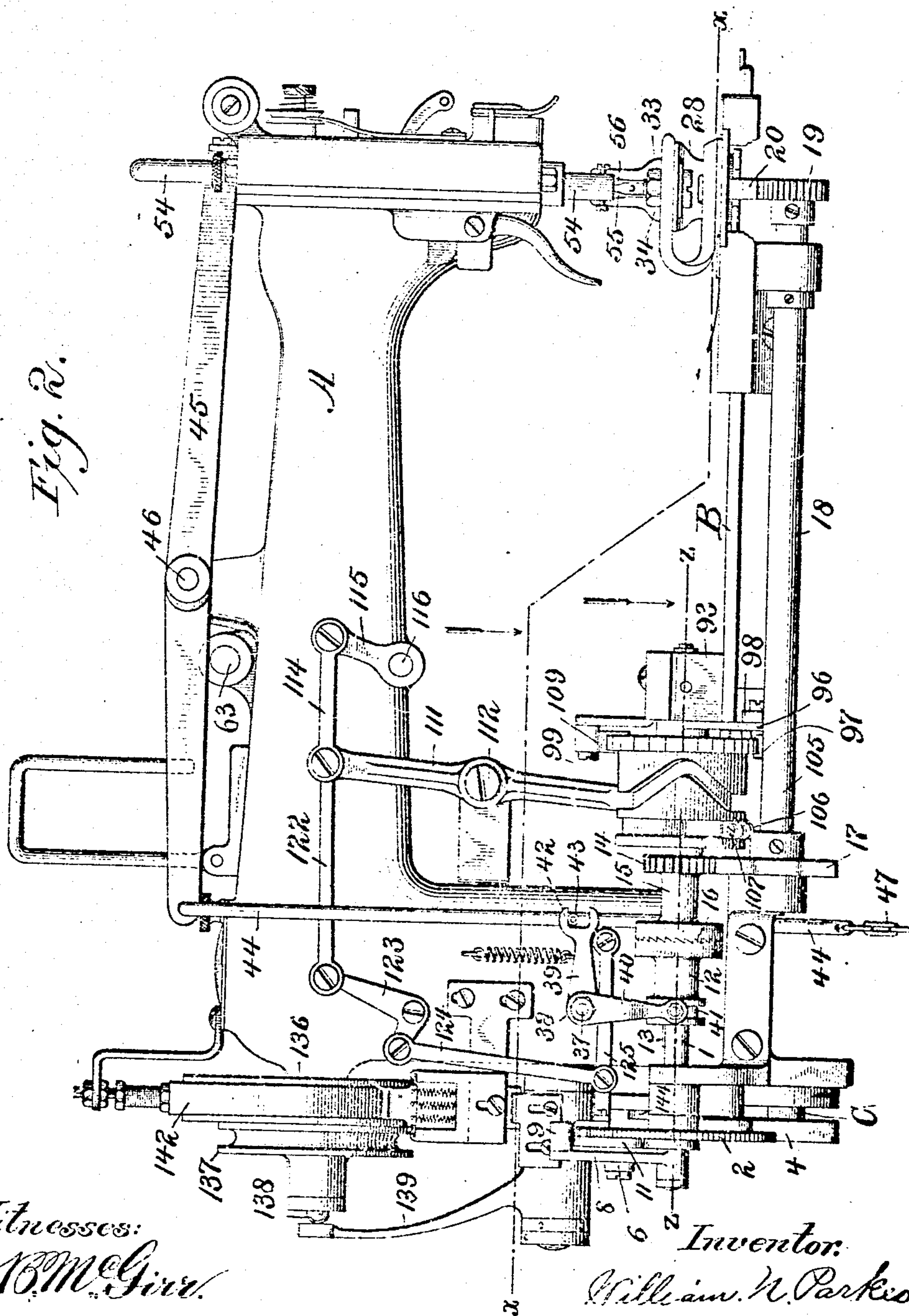
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6 SHEETS—SHEET 2.



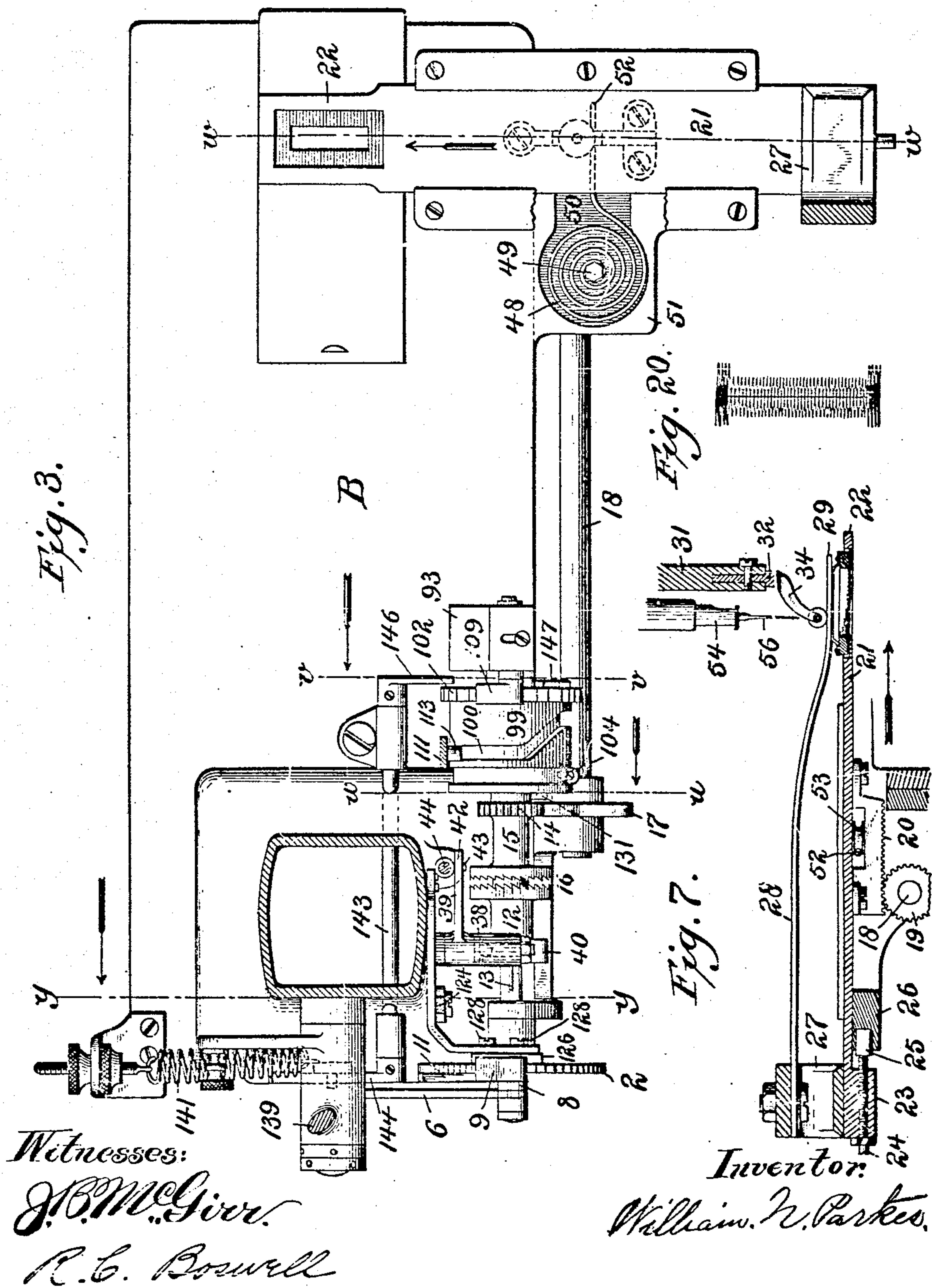
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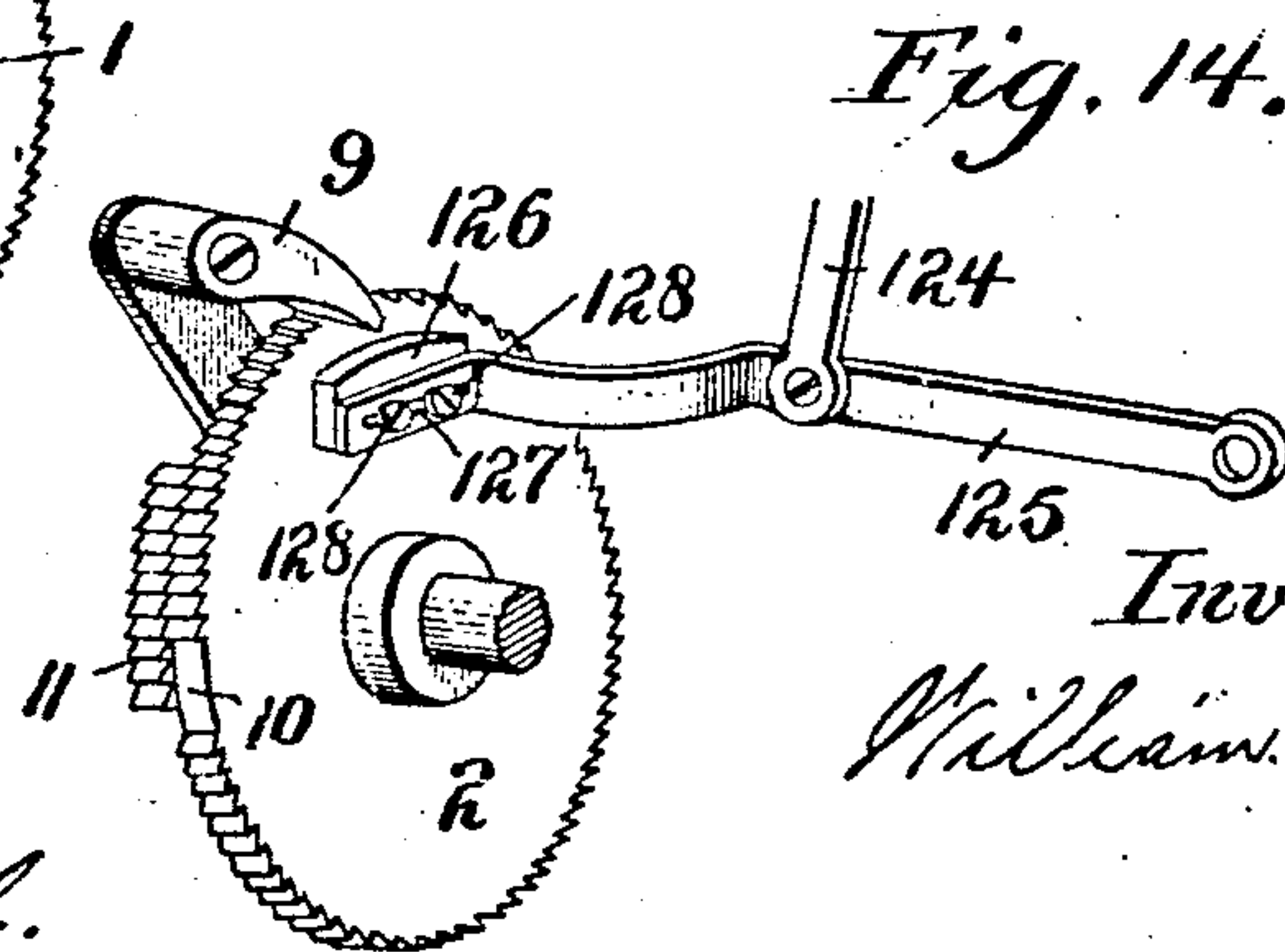
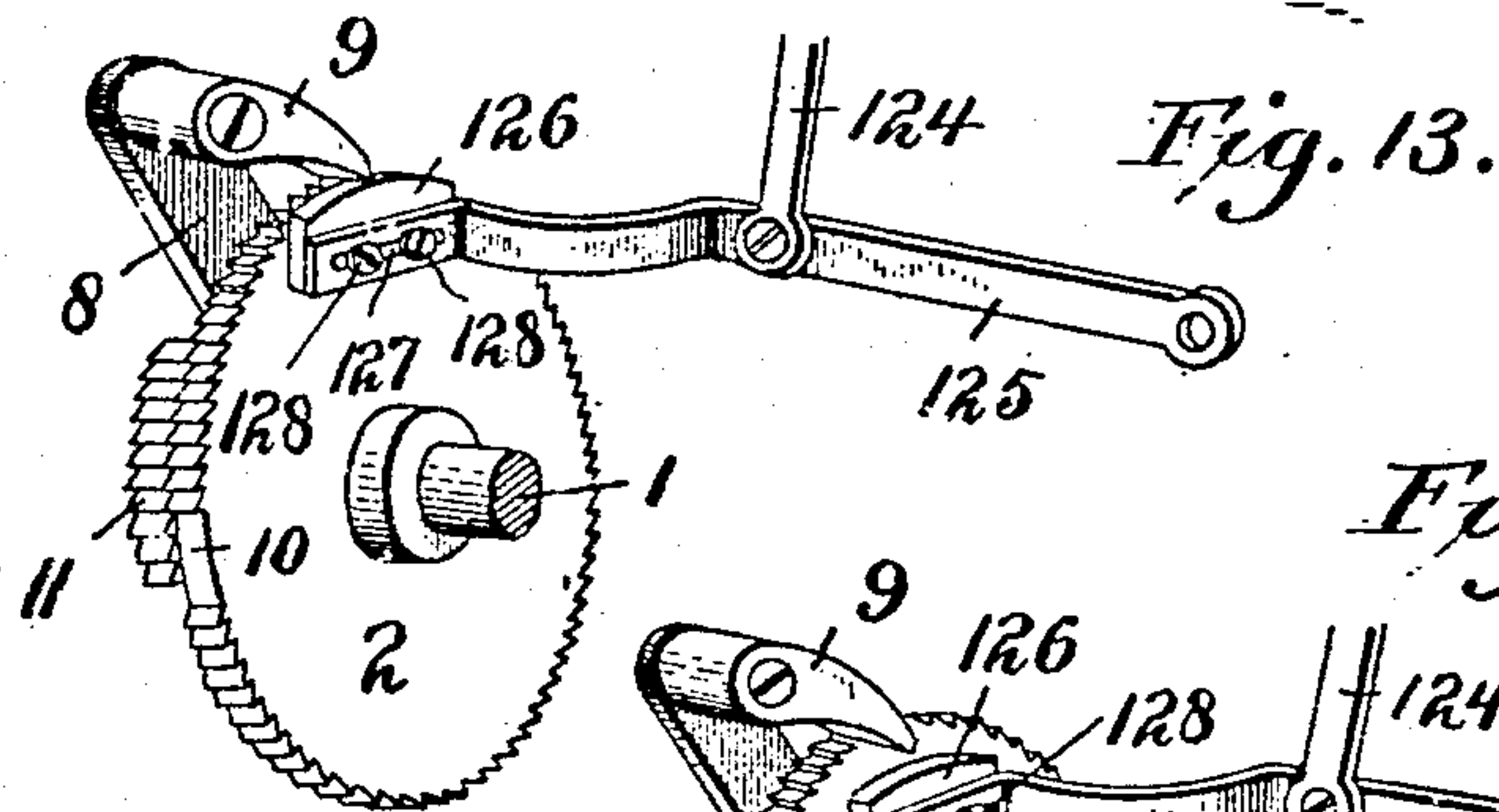
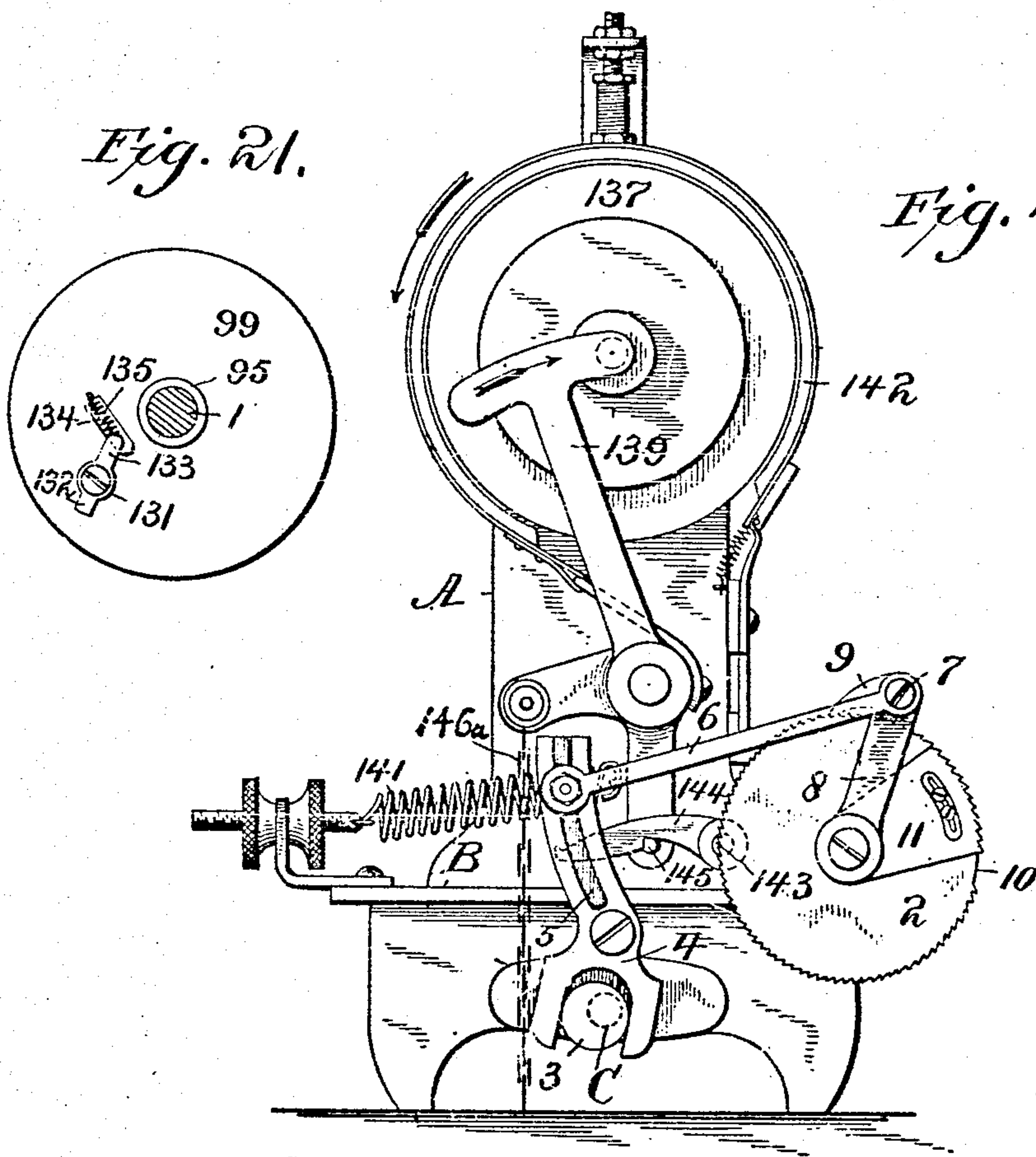
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8 SHEETS—SHEET 4.



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8 SHEETS—SHEET 5.

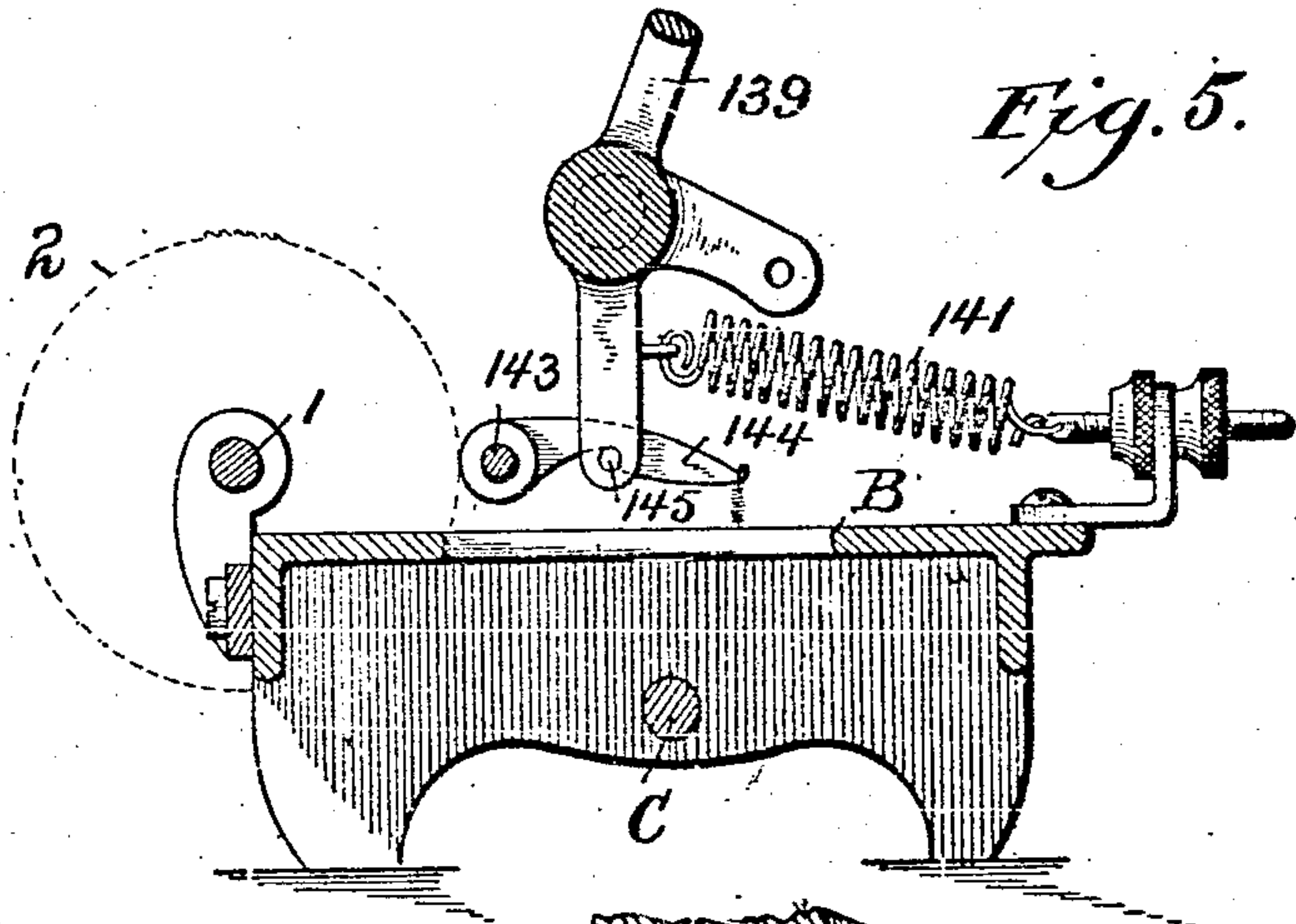


Fig. 5.

Fig. 11.

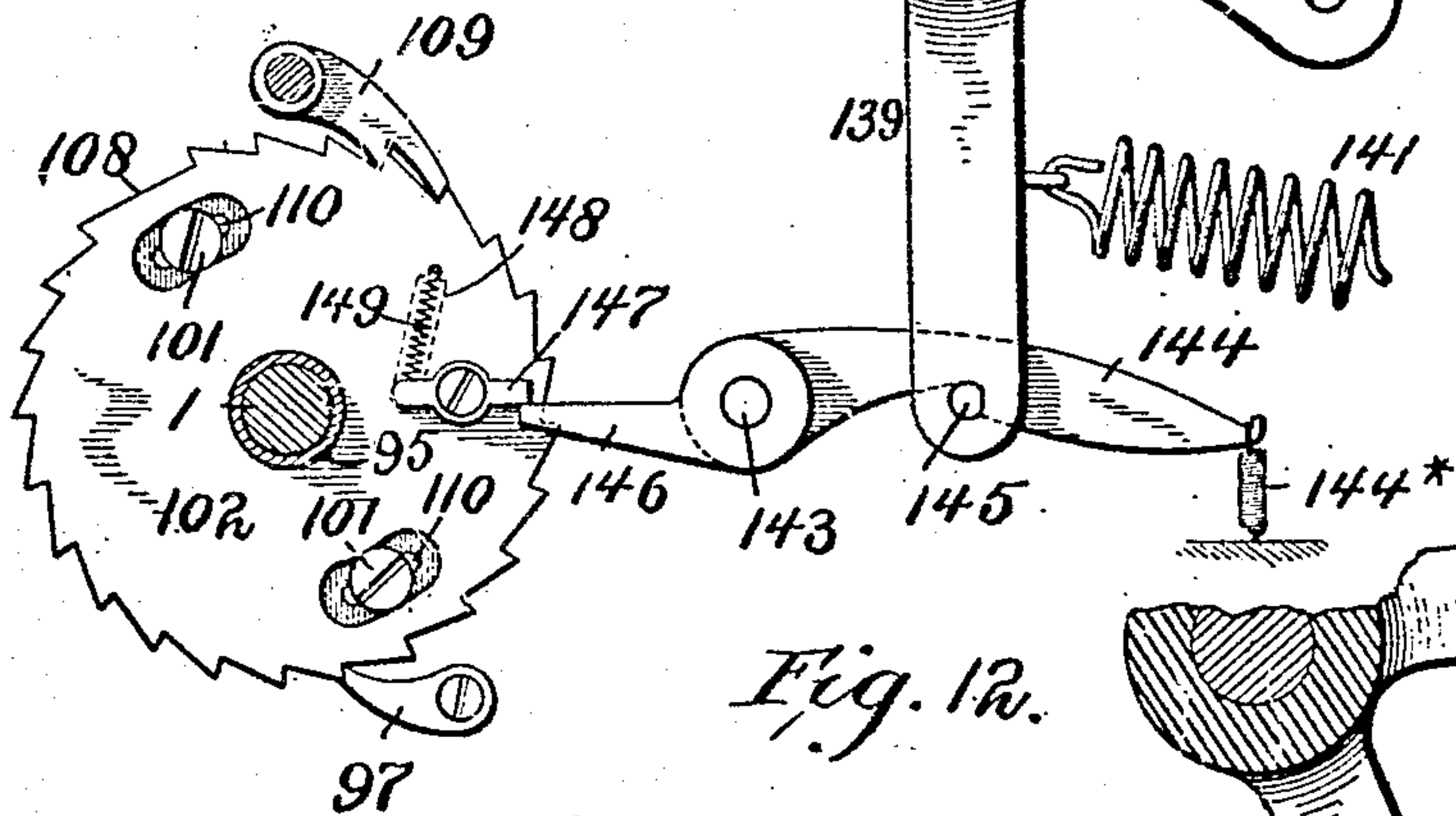
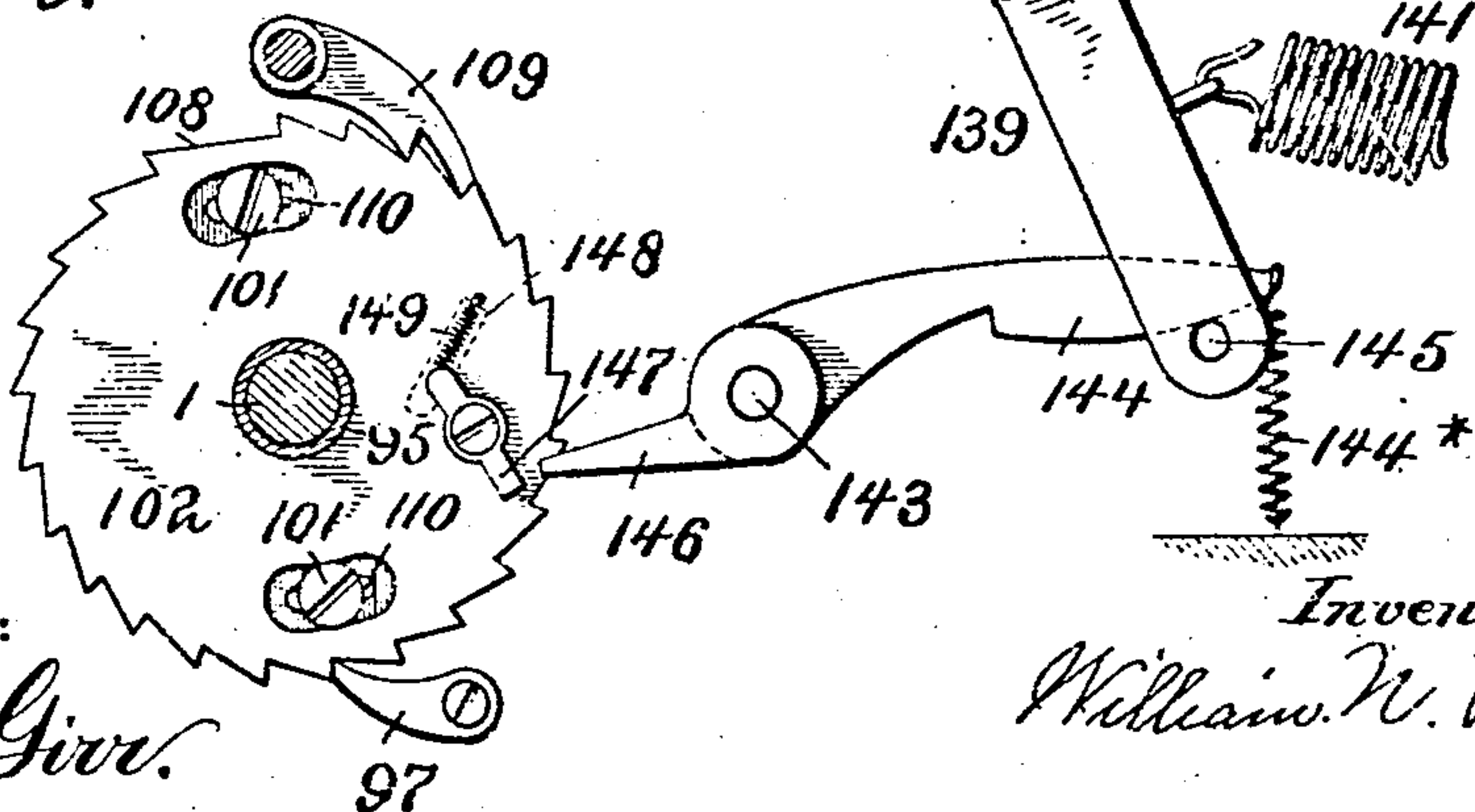


Fig. 12.



Witnesses:

J. B. McGiv.

R. C. Boswell.

Inventor:

William N. Parkes.

No. 875,602.

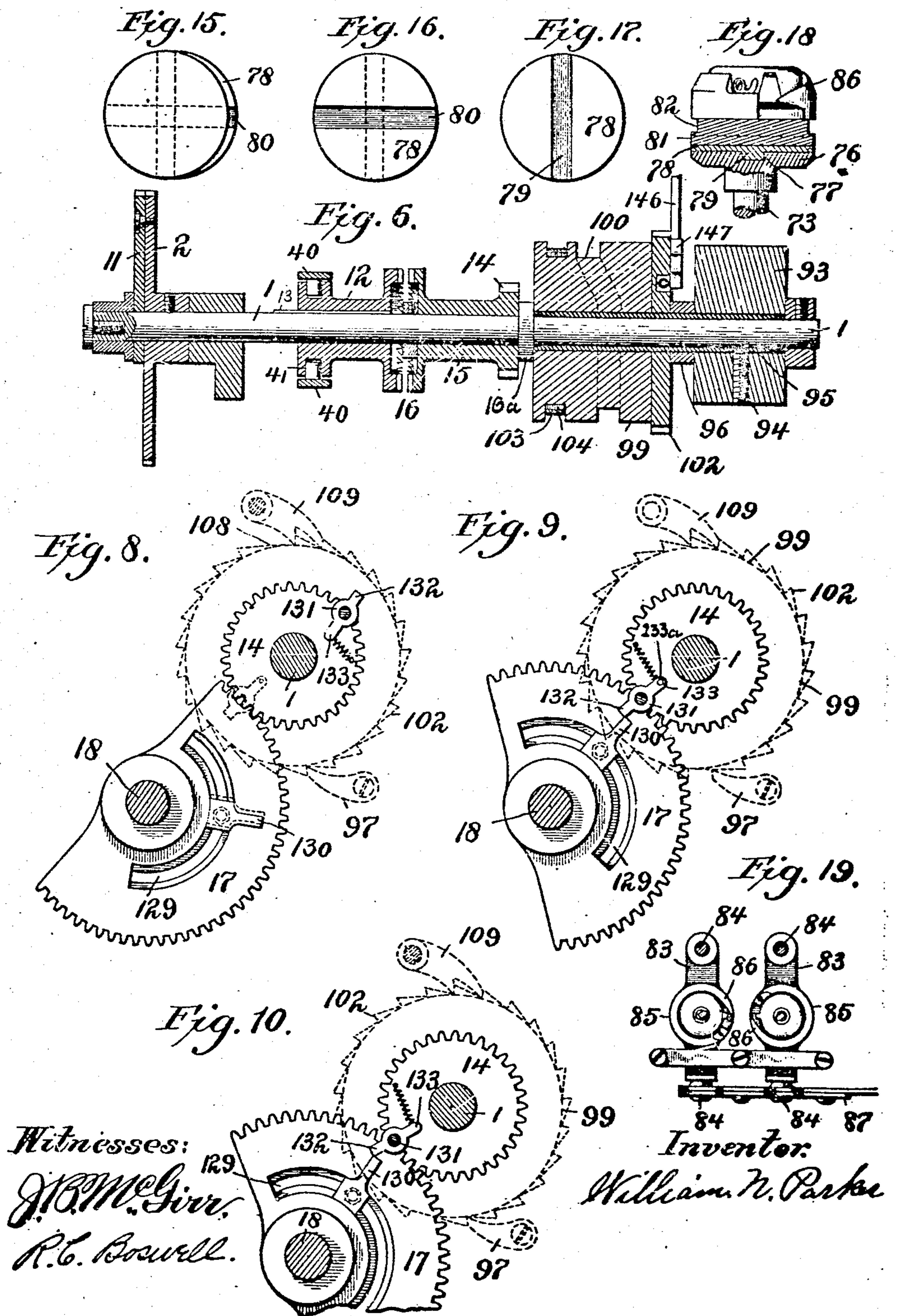
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W. N. PARKES.

BUTTONHOLE SEWING MACHINE.

APPLICATION FILED DEC. 17, 1900.

6 SHEETS—SHEET 6.



UNITED STATES PATENT OFFICE.

WILLIAM N. PARKES, OF BROOKLYN, NEW YORK.

BUTTONHOLE-SEWING MACHINE.

No. 875,602.

Specification of Letters Patent.

Patented Dec. 31, 1907.

Application filed December 17, 1900. Serial No. 40,144.

To all whom it may concern:

Be it known that I, WILLIAM N. PARKES, a citizen of the United States, and a resident of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Buttonhole-Sewing Machines, of which the following is a specification.

This invention relates to button-hole-sewing machines and has for its main objects improved means for automatically and simultaneously stitching both sides of the button hole, improved means for automatically barring or tacking the end thereof, and improved means for automatically stopping the machine.

In describing my improved machine the various mechanisms of which it is composed will be taken up in the following order:—1st a work carrier feeding mechanism adapted to feed the work different predetermined extents without interfering or effecting the barring at the ends of the holes; 2nd a work carrier adapted to be operated by the said feeding mechanism; 3rd means for returning the said work carrier to its initial position between the stitching or finishing of one button-hole, and the beginning of another; 4th stitch forming mechanism adapted to cooperate with the said feeding mechanism to simultaneously stitch both sides of the button hole; 5th barring or tacking mechanism adapted to bar the ends of the button-hole; 6th means whereby the said barring mechanism controls the feed of the work during the said barring of the ends of the holes; 7th means whereby the barring mechanism is brought into engagement with its actuator from the movement of a part of the feed mechanism; 8th a stop motion mechanism adapted to be tripped into action by the barring mechanism, and 9th means whereby the said stop motion is tripped into action by the said barring mechanism.

After the usual brief description of the drawings has been made, the mechanism will be described in the order mentioned above, and after the said mechanisms have been described the workings of the machine will be explained.

Various detailed objects of the invention will be seen in the description and in the claims.

Referring to the drawings: Figure 1 is a front elevation of a machine embodying my invention; Fig. 2 is a rear elevation of the

same; Fig. 3 is a top plan on the line $x-x$, Fig. 2; Fig. 4 is a rear end view; Fig. 5 is a section, some parts removed, on line $y-y$, Fig. 3, looking in direction of the arrow; Fig. 6 is a section on the line $z-z$, Fig. 2, looking in direction of the arrow; Fig. 7 is a vertical section on the line $w-w$, Fig. 3; Figs. 8, 9 and 10 are sectional details on line $u-u$, Fig. 3, looking in the direction of the arrow; Figs. 11 and 12 are sectional details on line $v-v$, Fig. 3, looking in the direction of the arrow, of the tripping device in connection with the barring or tacking ratchet-wheel; Figs. 13 and 14 are details showing means for regulating and controlling the feed of the work during the tacking of a buttonhole; Figs. 15, 16, 17 and 18 are details in connection with the mechanism for operating the loopers; Fig. 19 is a top plan view of the loopers and vibrating mechanism therefor; Fig. 20 is a diagrammatic view of the buttonhole; Fig. 21 is an end view of cam-drum 99 looking in the direction opposite that indicated by the arrow at line $u-u$ in Fig. 3.

All the parts and mechanism of my machine are supported on a "head" comprising the arm A, and the bed, or cloth, plate B. The driving shaft may be journaled, as usual, in the overhanging portion of the arm, and an under, or driven, shaft C, is journaled on the bottom of the bed B.

I will now describe the mechanism that I provide for feeding the work carrier during the stitching of the sides of the holes.

At the rear end of the base of the arm A, in suitable bearings, is mounted a shaft 1, to the rear end of which is attached a feed ratchet-wheel 2. To the rear end of the shaft C is attached an eccentric 3, which operates between jaws formed on the lower end of a segment-lever 4, pivoted to the bed-plate. In the upper end of the segment-lever 4, is formed a way 5, in which one end of a link 6, is adjustably connected, the other end of the link 6, being connected at 7, to a pawl-lever 8, which is pivoted on the rear end of the shaft 1. On the upper end of the pawl-lever 8, is pivoted a pawl 9, which is adapted to engage the ratchet-wheel 2. A gap 10, is formed in the teeth of the ratchet-wheel 2, and an adjustable toothed segment 11, is applied so as to vary the extent of said gap. On the shaft 1, is also mounted a clutch-member 12, which is adapted to be moved longitudinally on, and be rotated with, the said shaft 1, by means of feather 13,

which extends into a way, see Fig. 6, formed in the member 12. A gear-wheel 14, having a body 15, and clutch-member 16, is mounted to turn, but is held from longitudinal movement by means of a flange or collar 16^a forward on the shaft 1, the member 16, co-operating with the member 12, as herein-after described. The gear-wheel 14, meshes with the segmental-gear 17, which is fixed to the rear end of the shaft 18, mounted to turn in suitable bearings attached to the bed B. The diameter of the segmental-gear 17, is to the diameter of the gear-wheel 14, as 2 to 1, thus gear 17 and shaft 18 has only one-half the speed of gear 14. To the forward end of the shaft 18, is attached a gear-wheel 19, see Figs. 2, 3 and 7 which is adapted to operate the work carrier.

The way 5, is formed in the segment lever 4, concentric with the point or pivot 7, when the said pivot is moved to its extreme rearward position or when the eccentric is moved to a position which moves the upper end of the lever 4 to its extreme rearward position. By this formation of the way 5 the pawl 9 commences its forward or functional stroke at a given point or position no matter what the extent of the stroke of the said pawl 9 may be. The segment 11 is always adjusted so that the pawl 9 just crosses the gap 10 in the teeth of the ratchet wheel 2 engaging the first tooth across the said gap. The object of the above construction of the way 5 and the said gap 10 in the teeth of the wheel 2, is to cause the pawl 9 to commence to move the wheel 2 forward at predetermined points in the cycle of movement of the said wheel and consequently to commence to move the mechanism operated by the said wheel 2 forward at predetermined points no matter what the extent of the stroke of the pawl 9 may be.

The gap 10 in the ratchet wheel 2 is especially for the purpose of maintaining the position of the teeth of the ratchet wheel relative to the stroke of the pawl 9 so that the pawl will engage predetermined teeth of the said wheel. For example suppose the pawl 9 is feeding the wheel 2 forward at each stroke 4 teeth of the said wheel. Now suppose the wheel 2 is turned inadvertently or otherwise forward 2 teeth then when the said gap in the teeth of the wheel comes under the pawl, it is clear that the stroke of the pawl in the gap will be idle 2 teeth and will only move the wheel forward to the extent of two teeth. The next stroke of the pawl will engage the first tooth across the gap 10, and the wheel will again move forward in the proper time.

The foregoing is the mechanism provided for feeding the work carrier but it is to be understood that the said mechanism performs functions other than the feeding of the work carrier as will be seen from the further description of the machine. The parts 1 to

19 inclusive may be said to constitute the work carrier feeding mechanism. I will now describe the construction of work carrier.

A rack 20 is attached to a slide 21, which forms the lower member of the said work-carrier and which member is mounted in, and confined by suitable bearings, or guides, so as to reciprocate longitudinally only of the button-hole or transversely only of the bed B, and has an extending end 22, which is suitably slotted or apertured to permit of the operation of the needles therethrough. On the rear end of the slide 21, is formed a downwardly extending portion 23, through which passes a screw 24, the outer or free end of which is adapted to engage with an abutment 25, located in a bearing 26, attached to the bed of the machine. The abutment 25, and the screw 24, constitute an adjustable stop and serve as means for limiting the movement of the slide 21, in the direction shown by the arrow in Fig. 7, the abutment may be composed of any suitable material for the purpose. To the rear and upper end of the slide 21, is attached a bearing 27, which overhangs the slide 21, and to which is attached a flat plate-spring 28 which forms a part of the upper member of the work-carrier or clamp. The forward end of the member 28, is bifurcated so as to form extending portions 29 and 30, see Figs. 1 and 7 which carry shoes adapted to engage and clamp the work to the part 22 of the member 21, of the workcarrier. An ordinary presser-bar 31, is mounted in suitable bearings in the head of the machine and is depressed by a usual presser-bar spring. A presser-foot 32, is attached, in a suitable manner, to the lower end of the presser-bar 31. The presser-foot is bifurcated into the downwardly extending portions 33 and 34, in which are pivoted to turn rollers 35 and 36, respectively, which are adapted to engage, by rolling contact, the extending portions 29 and 30, of the upper member 28, of the work-carrier.

I have now described the parts of the work carrier, and the means for operating the same during the stitching of a button hole and the said work carrier and the means for operating it may be said to constitute the work feeding mechanism. The lower member of the work carrier may be said to be composed of the parts 20 to 27 inclusive and the upper member of the said work carrier may be said to be composed of parts 28 to 30 inclusive the means for depressing the upper member of the work carrier so as to clamp the work is composed of parts 31 to 36 inclusive it being understood that an ordinary presser bar spring before mentioned but not shown serves as a means for depressing the said presser bar 31. The flat spring 28 is so constructed that it lifts the upper member of the work-carrier to disengage the work when the presser bar is lifted the upward tendency

of the said spring being very light or just enough for the purpose of lifting the upper member from the work. The presser bar spring is strong enough to depress the upper member of the work clamp and thereby cause the same to firmly clamp the work. The anti-friction rollers 35 and 36 permit the free movement of the clamp under the pressure of the presser bar. The work clamp has no lateral movement it is simply moved in the direction of the length of the button-hole.

I will now describe the means by which, as the work clamp is opened and the work released the work carrier is automatically reversed or returned to its initial or original position.

To the rear side of the base of the overhanging arm A, is suitably pivoted at 37, a bell-crank lever 38, having members 39 and 40. To the lower end of the member 40, which is bifurcated, see Figs. 2 and 6, are attached roller-studs and rollers which extend at opposite sides into a groove 41, formed in the clutch-member 12. The member 39, is formed as at 42, and adapted to be engaged by a roller 43, which is suitably attached to a rod 44. The rod 44, at its upper end, is attached to a horizontal lever 45, which is pivoted at 46, to a bearing formed on the arm A. The forward end of the lever 45, is connected, in a suitable manner, to the upper end of the presser-bar 31, and is adapted to raise the same. To the lower end of the rod 44, is attached a chain 47, which extends downwardly to a suitable foot-lever (not shown) which is thus adapted to depress the rod 44, and through it the connected end of lever 45, and thereby raise the presser-bar 31. A spiral spring 48, is attached at 49, to a stud extending vertically in the receptacle 50, formed in a bearing 51, in the bed B, of the machine, the receptacle being of sufficient depth to permit of the free action of the spring. Said spring 48, has an extending end 52, which engages a stud or bearing 53, depending from the slide 21. The spring 48, is so constructed and located that its extending end 52, normally presses and, under proper conditions, moves the slide 21, in the direction shown by the arrow, see Fig. 3, and is of sufficient strength to move said slide in such direction and through its connection reverse the shaft 18, the gear-segment 17, and the gear-wheel 14, until the end of the screw 24, comes into engagement with the abutment 25. The said mechanism just described by means of which the work carrier is automatically reversed as the work is released from the machine by the operator, may be said to comprise the parts 37 to 52 inclusive.

I will now describe the stitch-forming mechanism.

A needle-bar 54, adapted to carry needles 55 and 56, arranged in line at a right-angle

to the direction of the feed of the work, is mounted in a usual gate 57, pivoted in suitable bearings (not shown) in the arm of the machine. A pitman 59, is attached at its forward end to the gate 57, and at its rear end to a lever 60, pivoted at 61, in the upper right portion of the arm A, as shown in dotted outline, Fig. 1. A segment-lever 62, is connected at its upper end to a short shaft 63, extending transversely of, and to turn in a suitable bearing on, the arm A, the lever being in engagement at its lower end with a usual switch-cam (not shown) mounted on the upper shaft of the machine. A way 64, is formed in the segment-lever 62, in which runs a usual sliding shoe having connected to it, at 65, the forward end of a link 66, the rear end of which link is connected to the upper end of the lever 60, at the point of connection of pitman 59 see Fig. 1.

It will be understood that, when the machine is in operation, the segment-lever 62, is vibrated and, through the link 66, the lever 60 is vibrated, and through the pitman 59, the needle-bar gate 57 is vibrated, and through it the needle-bar 54, is bodily vibrated laterally. The movement given to the needle-bar by this mechanism is the usual jogging motion given to needle-bars in zigzag or buttonhole sewing machines.

To the forward end of the shaft C is attached a gear-wheel 67, which meshes with a gear-wheel 68, attached to a shaft 69, which is mounted in bearing 70, on the bottom of the bed B. The gear-wheel 67, is twice the diameter of gear-wheel 68, which ratio causes two rotations of shaft 69, to one rotation of shaft C. The result, of this difference in speed between the two shafts,—the driven shaft C rotating in the same time with, and having the same number of rotations as, the main driving, or needle-bar actuating, shaft,—is to cause the loopers, of the stitch-forming mechanism, to have two rotations to a single and every reciprocation of the needles. A bevel-gear 71, is attached to the shaft 69, and meshes with a bevel-gear 72 mounted on an upright shaft 73, which is adapted to turn in bearing 70. To the forward end of the shaft 69, is attached a bevel-gear 73*, which meshes with a bevel-gear 74, mounted on a vertical shaft 75, which is adapted to turn in bearing 70. To the upper end of each of the shafts 73 and 75 is attached a disk 76, which has a way 77, formed across its face. Next to the disk 76, and on the top of the same, is an idle disk 78, having a feather 79, formed across its bottom, which is adapted to ride in the way 77. Feather 80, is formed across the top of disk 78, at right angles to the feather 79. A looper-carrier 81, is mounted on the top of the idle disc 78, and has a way formed in its bottom in which the feather 80, extends. The upper portion of the looper-carrier 81, is reduced as at 82. Lever 83, is

pivoted to a suitable bearing at 84. The levers are enlarged, as at 85, and encompass the reduced portion 82, of the looper-carriers 81. To the top of the looper-carrier is attached
 5 a looper 86, which may be of any suitable construction to engage the loop of the needle-thread. The loopers as shown are the same diameter as the large portion of the disk 81, thus providing a means for retaining the
 10 levers 83, on the reduced portion 82 of the loop carriers.

The connection as described between the shaft 73, and the looper 86, is for the purpose of permitting the looper carrier to be moved
 15 horizontally in any direction. The idle disk 78, may move across the face of the disk 76, in the direction of the groove 77, and the looper-carrier 81, may move across the face of the idle disk 78 in a direction at right
 20 angles to the groove 77, thus it is seen that the looper-carrier 81, may be given a universal movement. For example while the looper-carrier 81 is moved at right angles to the groove 77, it may also be moved in the
 25 direction of said groove the idle disk 78 moving with the looper-carrier when the same is moved in the direction of the groove 77. The outer end of each of the levers 83, is provided with a ball 84, connecting with one end
 30 of a pitman 87, the rear end of which is connected to a lever 89, suitably pivoted at 88, to the vertical portion of the arm A of the machine, as indicated in dotted outline see Fig. 1. A stud 90, is attached to the upper
 35 end of the lever 89, and carries a shoe 91, which is adapted to operate between jaws 92, formed on the lower end of the lever 60.

It is to be understood that the movement of the lever 62 is transmitted by means of
 40 link 66 to lever 60, and from the lever 60 to the lever 89, and from the lower end of the lever 89 by means of link or pitman 87 to the levers 83. When the lever 62 moves to the right the link 59, moves to the right and the
 45 needle-bar gate of course moves in the same direction thereby moving the needles to the right, and by reason of the double lever connection 60 and 89 and the link 87 the loopers are also moved to the right, and when the needles
 50 are moved to the left the loopers like-wise are moved to the left. This will be clearly understood by reference to Fig. 1. The levers 60, 89 and 83, and the parts in connection with the same are so proportioned and constructed
 55 that the loop takers are given the same extent of lateral movement as the needles under any adjustment of the link 66 in the way of the lever 62.

The stitch forming mechanism has now
 60 been described the means for giving the needles lateral movement of a uniform extent, and the loopers lateral movement of the same extent in unison with the said needles has been included in the said stitch
 65 forming mechanism.

The mechanism that has just been described for moving the needle-bar and loopers laterally acts to make the depth and edge stitches along the sides of the button hole, and as such stitches are necessary in the
 70 stitching of button holes, this mechanism is included in the stitch forming mechanism. The stitch forming mechanism may be said to include the parts 54 to 92 inclusive. The barring mechanism will now be described. 75

In a bracket 93, which is attached to the top of the bed-plate B, is secured by means of a screw 94, one end of a cylindrical bearing 95, which extends horizontally from the
 80 said bracket, see Fig. 6, and through which the forward end of shaft 1 extends and is free to turn therein. Next to the bracket 93, on the extending portion of the cylindrical bearing 95, is journaled the upper end of a pawl-lever 96, which carries a pawl 97. 85
 The pawl-lever 96 is operated by means of a connection 98, which extends to and encircles in a usual manner an eccentric mounted on the lower shaft C of the machine, these parts being partially shown in Fig. 2, the
 90 construction of the said eccentric and the manner of driving the pawl 96 is clearly illustrated in my Patent #658578 Button-hole sewing machine issued to me September
 95 25th 1900 (see Fig. 4 of said patent). As the means for driving the pawl 96 are the same as shown in the said patent it is not thought necessary to illustrate the same further in this application. On the bearing 95
 100 is mounted to turn a cam-drum 99, groove 100 being formed therein and to the end of said cam is adjustably attached, by means of screws 101, and curved slots 110, see
 105 Figs. 11 and 12, a ratchet-wheel 102, the teeth of which are adapted to be engaged by the pawl 97. In the operation of the machine the extent of the stroke of the pawl 97 is one tooth of the ratchet-wheel 102. Any
 110 usual friction device can be used for controlling the movement of the ratchet-wheel 102 and the cam 99. In the present instance I have partly shown, in Figs. 1, 2, 3 and 6, the following means for controlling the said
 115 wheel and cam. In a groove 103 formed in the cam 99, is located a friction-strap 104, having extensions 105 and 106. A screw 107 passes freely through extension 105 into a seat in extension 106. This screw serves as a means for regulating the amount
 120 of the friction between the strap and the cam. A usual spring (not shown) is attached to the underside of the extension 106 and to a stationary part of the machine, so
 125 as to draw on the strap in the direction opposite to the forward movement of the cam. In the teeth of the ratchet-wheel 102 is
 130 formed a gap 108, see Figs. 11 and 12, formed by eliminating one tooth of the said wheel. A double toothed stop pawl 109 is suitably pivoted to a stationary part of the

machine in position to engage the teeth of wheel 102 and prevent retrograde movement of the latter. Slots 110 permit of the circular adjustment of the wheel 102 by means of the screws 101, this adjustment being to properly locate the teeth of the wheel 102 relatively to the cam-groove 100. A lever 111 is suitably pivoted on a bearing at 112 and is in engagement at its lower end, by means of a usual anti-friction roller 113, with the cam-groove 100.

To the upper end of the lever 111 is pivoted the rear end of a link 114, the forward end of which is attached to the upper end of an arm 115, which is attached at its lower end to a shaft 116 mounted to turn in the horizontal portion of arm A of the machine. To the forward end of the shaft 116 is attached a segment-arm 117, see Fig. 1, which has a curved way 118, formed in its face.

The lower end of a link 119 is adjustably attached in the way 118, the upper end of said link being connected to the forward end of the link 66. The link 119 is formed of two parts and is thereby adapted to be adjusted as to its length by means of a screw 120 and a slot 121. It will now be seen that if the lever 111 is oscillated, the shaft 116 will be rocked and through it the connection 65 will be moved from and towards the pivot of the lever 62 in the way 64 of the segment-lever 62 and that the extent of the said movement will be determined by the position, of the lower end of the link 119, in the way 118, of the segment-arm 117. It will also be seen that the reciprocating position of the parts 65 in the way 64 may be changed by the adjustment of the length of the link connection 119. The gap 108 in the wheel 102 is for the purpose of arresting the movement of the said wheel, and the mechanism operated by it when the gap comes under the actuating pawl 97, so that the barring mechanism may be idle during the stitching of the sides of the hole. This will be more clearly understood in connection with the explanation of the working of the machine. The means provided for changing the character of the stitches at the end of the button-hole so as to form barring stitches have now been described these means may be said to comprise parts 93 to 121 inclusive.

In a button-hole machine it is desirable to have the feeding of the work uniform, and of a predetermined extent, and to have the stitches along the sides of the hole spaced a predetermined extent and to have this movement maintained under different adjustment of the length of the button-hole. It is also desirable to have the work moved a predetermined extent during the barring of the ends of the button-hole, and to have this movement of the work maintained under different adjustment of the length of the button-hole or different extent of spacing along

the sides of the button-hole. For the purpose of accomplishing the results desired the barring mechanisms which I have just described is adapted to control the feeding mechanism during the barring of the button-hole. These means provided for controlling the feeding mechanism by the barring mechanism will now be described.

To the upper end of the lever 111, is attached one end of a link 122, the other end of the said link being connected to one end of a bell-crank lever 123, pivoted on the arm A. To the other end of the lever 123, is connected the upper end of a link 124, which link at its lower end is connected to a lever 125, pivoted to the frame as seen in Fig. 2. On the outer end of the lever 125, which is bent as shown in Figs. 13 and 14, is adjustably attached a shield 126, the slot 127 and screws 128 serving as means for adjusting the same. The parts just described 122 to 128 inclusive may be said to constitute the means intermediate the barring mechanism and the feeding mechanism which is controlled by the barring mechanism during the barring or stitching of the end of the button-hole.

In this machine the length of the button-hole is determined by the length of the operation of the feeding mechanism after the barring of the first end of the button-hole has been completed and before the barring of the finishing end of the button-hole is commenced and the extent of this feeding operation or the length of the button-hole is determined by the adjustment of the device which starts the barring mechanism into operation, the said barring mechanism is idle during the binding of the sides of the button-hole, as will be more fully understood from the description of the working of the machine.

I will now describe the means provided intermediate the feeding mechanism, and the barring mechanism whereby the latter is brought into engagement with the means for actuating it.

In the segment-gear 17, of the feeding mechanism, is formed a concentric slot or way 129, in which one end of the tripping-tappet 130, is located and adapted to be adjusted, as shown in Figs. 8, 9 and 10, the other end of said tappet extending radially, as shown. On the end of the cam-drum 99, is pivoted a tappet-lever 131, see Figs. 3 and 9, having extending ends 132 and 133. A slot 134 is formed in the end of the cam-drum 99, see Fig. 21, and in this slot is located a spring 135, which is attached at one end to a pin 133, see Fig. 9, projecting from the end of the lever 131, and at its other end is attached, to the cam-drum 99. The pin, as will be understood, projects into the slot 134, and limits the movement of the lever 131 by reason of its engagement with the wall of

said slot. The foregoing parts 129 to 134 inclusive may be said to constitute the means by which the feeding mechanism trips or causes the barring mechanism to be engaged 5 by its actuator.

The stop motion mechanism will now be described. To the upper shaft of the machine is attached a wheel 136, next to which, and on the end of the same shaft, is loosely 10 mounted a wheel 137 adapted to clutch and turn the wheel 136. This wheel 137 is provided with an extending portion 138. A lever 139 is suitably pivoted on the arm of the machine and provided at its upper end with 15 an inclined portion 140 which is adapted to engage the portion 138 of the wheel 137 and press the said wheel into engagement with the wheel 136. To the lower end of the lever 139 is attached a spring 141 which normally 20 tends to draw the lever 139 in the direction shown by the arrow see Fig. 4. A friction strap 142 is suitably held to engage and clutch the wheel 136 when the lever 139 is operated by the spring 141. In suitable 25 bearings in the arm of the machine, see Fig. 3, a shaft 143 is mounted, to the rear end of which is attached a latch-arm 144 which is normally held in the position shown in Figs. 4 and 11 by means of a spring 144* one end of 30 which is attached to the outer end of the said latch arm and the other end to the bed of the machine. The latch arm 144 is adapted to engage a stud 145 projecting horizontally from the lower end of the lever 139 more particularly seen in Figs. 11 and 12. To an arm 35 extending horizontally from the lever 139 is attached the upper end of a chain 146^a as shown in Fig. 4, the lower end of the said chain (not shown) may be operated in any 40 usual manner to return the stop motion parts to their normal position which position is shown in Fig. 4. The said chain for example may be operated as shown by me in my Patent #653,938 issued July 17, 1900.

45 Parts 135 to 146^a may be said to constitute the stop motion.

I will now describe the means by which the stop motion is tripped into action.

50 A small lever 147 is pivoted on and carried by the ratchet wheel 102 as seen in Fig. 11.

A slot 148 is formed in the ratchet-wheel 102, in which is located a spring 149, one end of which is attached to the wheel 102, and the other end to a pin (not shown) carried by the 55 inner end of the lever 147, and which said pin projects into the slot 148. The spring 149 normally draws the lever 147 into the position shown in Fig. 12.

60 The lever 147 is so located and constructed that it at the proper time engages with the arm 146 and trips the stop motion into action.

The operation of the stop motion and of the means for tripping it into action, will be

explained in connection with the explanation 65 of the working of the machine.

The cam groove 100, in the cam 99 is so constructed that it holds the lever 111, and the parts operated by it, in the position shown 70 in Figs. 1, 2, and 13, during the tacking of the ends of the button-hole, the cam during the said tacking makes one complete rotation less the extent of one tooth of the ratchet wheel 102. The roller 113 at the lower end 75 of the lever 111, is in the curved position of the cam groove 100, and just at the bottom of the same, when the said cam is at rest, as it is during the stitching of the sides of the hole. The said curved portion is sufficiently 80 inclined to move the said lever a sufficient extent to make the necessary change in the movement of the needle to produce lateral movement of the same necessary for the overlapping of the stitches at the ends of the hole.

I will now describe the working of the machine. 85

The length of the link 119, is suitably adjusted so that the end of the link 66, will be properly located in the groove 64, to give the 90 desired extent of lateral movement to the needle during the stitching of the sides of the hole, and the lower end of the link 119 is suitably adjusted in the way 118 to properly change the extent of the lateral movement of 95 the needle, so as to give the extent of lateral movement to the needle desired for the purpose of barring the ends of the button-hole. In the present example of my invention the movement of the needles is such, that the 100 extent of lateral movement of the same is increased at the ends of the button-hole, so that the stitches overlap and thereby reinforce the stitching where the greater strength is desired, see Fig. 20.

If it is desired to reduce the feed of the 105 work during the barring of the button-hole, the shield 126 is adjusted so as to limit the extent of the engagement of the pawl 9, with the teeth of the ratchet wheel 2, for example if the pawl 9 is feeding 4 teeth of the ratchet 110 wheel 2, during the feed of the work for the stitching of the sides of the buttonhole, and it is desired to reduce the extent of the feed of the said work by one 1/4 then the shield 115 126 will be so adjusted as to limit to 3 teeth the engagement of the pawl 9 with the ratchet wheel 2.

The length of the button-hole is determined by the adjustment of the tappet 130, in the 120 groove 129. For example when the tappet is adjusted as shown in Fig. 8, the machine will continue stitching the sides of the button-hole longitudinally of the same until the said 125 tappet 130, engages tappet 132 and thereby turns the barring mechanism into action, see Fig. 9.

The work carrier in the stitching of a button-hole always commences to move forward

from a given point or position under various adjustments in the length of the button-hole. At the beginning of a button-hole the lever 111, is in the position indicated in Fig. 2, and the roller 113, is in the cam-groove 100 just opposite the point in said cam-groove crossed by line Z—Z Fig. 2, in the said cam, said barring mechanism having operated to bar the finishing end of a button-hole previously made when the machine was stopped. In other words at the beginning of a button-hole the barring mechanism is in position to bar the first end of the button-hole.

In the ordinary button-hole sewing machine, some kind of a friction device is always applied to the feed wheel to prevent undesirable movement of the same. In my present invention as is seen the spring 48 when the machine is in operation always exerts a yielding force on the feed wheel in the opposite direction to its forward movement thereby preventing any undesirable movement of the wheel or the parts operated through it. Thus it is seen the force for reversing the work carrier is also utilized to prevent undesirable movements of the same and makes it unnecessary to apply any other friction to the movement of the mechanism between one carrier and the feed wheel. This construction always keeps the lost motion up in the parts between the carrier and the feed wheel and insures a perfect feed of the work.

In the operation of the machine the presser bar 31, is raised by the attendant, and the work placed in proper position to be clamped after which the presser bar 31, is lowered and the work is securely clamped thereby in the work carrier. The machine is now started, and the barring of the first end of the button-hole is commenced, and continued until the gap 108 in the teeth of the tacking ratchet 102 comes under the actuating pawl 97, when further movement of the said wheel is arrested and the pawl 97 beats time in the said gap. This movement of the wheel 102 brings the curved position of the cam 99 around to a position where the roller at the lower end of the lever 111, is in the said cam groove at the point where the line Z—Z crosses the said groove Fig. 2. The movement of the lever 111, from the action of the cam groove in turning to the point mentioned, operates through the connection between the upper end of said lever to turn the arm 117, so that the outer end of the said arm moves upwardly, thereby moving the end of the link 66, nearer to the pivot 63 of the lever 62. This movement reduces the extent of the lateral movement of the needle to the amount required for the stitching along the sides of the hole. This movement of the barring mechanism lowers the link 125 so that the shield at the end of the same, is disengaged from the pawl 9, and the pawl now operates

the wheel 2 to feed the work for the stitching along the sides of the hole, and this movement continues until the tapper 130 engages the end of the tappet lever 132 and through this engagement turns the tacking ratchet a sufficient extent to bring the first tooth across the gap 108 into engagement with the actuating pawl 97, when the barring at the finishing end of the button-hole is completed. The portion crossed by the line Z—Z of the cam groove 100, in practice is so constructed that the parts operated by it are not moved, during the turning of the said cam the extent necessary to bring the actuating pawl 97, into engagement with the teeth of the ratchet wheel 102.

The stop motion tripping tappet lever 147, is so located that when the barring of the finishing end of the button-hole is completed, it engages the tripping arm 146, of the stop motion, and trips the stop motion into action, at this point the barring mechanism has turned $\frac{1}{2}$ around, or in other words $\frac{1}{2}$ of the cycle of the movement of the same has been used, barring the finishing end of the button-hole. It is thus seen that the barring mechanism is in operative position during the stitching of both ends of the button-hole, in other words that the barring mechanism is constructed and adapted during a cycle of its movement, to bar both ends of the button-hole before going out of action, and that the said barring mechanism goes out of action from its own movements, after barring the first end of the button-hole.

After the stop motion has stopped the machine, the operator lifts the presser bar 31, throughout the movement of chain 47 and the parts connected with the same a sufficient extent to release the work, when this point has been reached the movement of the chain 47, causes the roller 43, to engage the bell-crank lever 39, and thereby move the clutch 12 so as to disengage the cam from the clutching portion of the part 15, this movement releases the mechanism intermediate the clutch and the work carrier which latter is immediately returned to its initial position through the action of the spring 48. The return of the work carrier takes place during the time the operator changes the work for the next button hole, and in less time than it takes for the said change, therefore no time is lost from the return of the work carrier to its initial position.

After the machine has been tripped into action the stop motion tripping parts assume the positions shown in Fig. 12. These parts which will be readily understood by reference to the said figure are so placed relatively to each other that a movement of the lever 139 by means of the chain 146^a so that the upper part of said lever moves in a direction opposite to that shown by the arrow on the

upper part of the same, throws the stop motion back into its normal position. The stop motion will not be again tripped into action until the barring ratchet 102 has again made a complete rotation, thereby bringing the tripping tappet 147, carried by the same into engagement with the arm 146, of the stop motion mechanism.

It is desirable in button-hole sewing machines to have the barring mechanism operated much more rapidly than the feed mechanism operates, and it is also desirable to trip the stop motion into action at the earliest possible moment after the last stitch in the finishing end of the button-hole has been completed, so that the machine may be stopped before the needle again reaches the work after the completion of the said last stitch. For these and other reasons I have made a barring mechanism which operates much more rapidly than the feeding mechanism, and provided means whereby the said barring mechanism trips the said stop motion into action. The speed of the movement of the barring mechanism, relative to the speed of the feeding mechanism will be understood, when it is remembered that the wheel 102 makes substantially a complete rotation during the barring of the ends of the button-hole. In the ordinary button-hole machines, the stitching of the sides of the hole, and the barring of the ends thereof, is done during a single rotation of a feed wheel.

I do not wish to be confined to the particular form of mechanism herein illustrated and described as it is evident that changes may be made in it without departing from the spirit of my invention.

One of the main objects of returning the work-carrier to its initial position, without making a button-hole during said return movement is to always finish the hole with the work in the same position so that an automatic cutter may be conveniently used in connection with the same. It is evident that when a button-hole is completed during the movement of the work-carrier in one direction, and then another one completed during the movement of said carrier in an opposite direction that the work is in different positions at the finishing of each button-hole so if a cutter is properly located to cut the hole in one of said positions it will not be properly located for cutting the hole in the other of said positions, unless the position of the cutter is changed or two cutters are provided.

Starting the making of a button-hole with the work always in the same position and finishing it with the work always in the same position makes it convenient for a number of well known cutter devices to be used in combination with the invention herein dis-

closed. For example the cutter device shown in my Patent Number 658,578, issued September 25, 1900, and 674,176, issued May 14, 1901, may be used.

There are a number of other advantages in commencing a button-hole always at a given point, finishing both sides of it simultaneously and completing it at a given point as has been seen from the drawings and the foregoing specification. And by returning the carrier automatically during the time that the operator is changing the work to a position of commencing another button-hole loss of time is avoided.

While much of this invention is confined to a button-hole machine adapted to simultaneously stitch both sides of a button-hole, it is obvious that it is not all confined to such a machine, and therefore many of the claims have not been limited to this kind of a machine.

The term barring mechanism used in the claims is to be understood to mean the mechanism by means of which the relative movement between the stitch forming mechanism and the work is changed and controlled to make the stitches at the end of the button-hole.

What I claim as new, is:—

1. In combination in a button-hole sewing machine, a stitch forming mechanism for simultaneously stitching both sides of a button-hole, a feeding mechanism, a barring mechanism, an actuator separate from the movement of the feeding mechanism for operating said barring mechanism, and means adapting a part of the feeding mechanism to cause said actuator to operate said barring mechanism once to each complete button-hole stitching operation of said machine.

2. A button-hole machine comprising a stitch forming mechanism adapted to simultaneously stitch both sides of a button-hole, a feeding mechanism, a barring mechanism having a part that is adapted to move circularly, said part normally out of action, an actuator that operates separately from the feeding mechanism, and means adapting said feeding mechanism to turn said part into engagement with said actuator.

3. A button-hole machine comprising a stitch forming mechanism adapted to simultaneously stitch both sides of a button-hole, a feeding mechanism comprising a feed wheel, a barring mechanism including a part adapted to move circularly, an actuating device for intermittently moving said part, and means adapting the feeding mechanism to turn said part into engagement with said actuating device.

4. A button-hole machine comprising a stitch forming mechanism, a feeding mechanism a barring mechanism which is normally

out of action, a vibrating part for actuating said barring mechanism, means adapting a part of the feeding mechanism to cause said vibrating part to actuate said barring mechanism separately from the feeding mechanism, a stop motion device, and means whereby said stop motion device is tripped into action from a moving part of said barring mechanism.

5 5. The combination in a button-hole machine having a stop motion mechanism, of a stitch forming mechanism for making the side stitches of a button-hole, a ratchet operated mechanism for moving the work to dis-
15 pose said stitches, a second ratchet mechanism, that is operated separately from said first ratchet operated mechanism, means adapting said second ratchet mechanism to change the stitch forming mechanism to
20 make the end stitches of a button-hole, and means whereby the aforesaid stop motion mechanism is tripped into action from the movement of said second ratchet mechanism.

6. A button-hole machine comprising a
25 work support, a stitch forming mechanism adapted to stitch a complete button-hole during the movement of said work support in one direction, a feeding mechanism for operating said work support, a cam adapted
30 to change the stitch forming mechanism to make the end stitches of said button-hole, means for operating said cam separately from said feeding mechanism, a stop motion mechanism, and means whereby said stop
35 motion mechanism is tripped into action from the movement of said cam.

7. A button-hole machine comprising a work moving mechanism having a work
40 work clamp, means for positively moving said work clamp in one direction, a stitch forming mechanism adapted to complete the stitching of a button-hole during the movement of said work clamp in said direction, means for opening said clamp, and means whereby
45 when the clamp is opened it is automatically returned to its initial position.

8. A button-hole sewing machine comprising means for simultaneously stitching both sides of a button-hole, a work-carrier
50 including a work clamp, means for operating said work carrier during the stitching of a button-hole a device for automatically returning said work clamp to its initial position after the completion of a button-hole, and
55 means whereby said device is tripped into action when said work clamp is opened.

9. A button-hole sewing machine adapted to simultaneously stitch both sides of a button-hole including two vertically recipro-
60 cating and laterally vibrating needles, a work-carrier including a work clamp, means for operating said work carrier during the stitching of a button-hole a device for automatically returning said work clamp to its

initial position after the completion of a
button-hole, means whereby when said clamp is opened said device is tripped into action, and means for manually opening said work clamp.

10. A button-hole machine comprising a
70 stitch forming mechanism, a work moving mechanism including a work carrier and a feed wheel, a barring mechanism that is turned into action from the movement of said feed wheel, a stop motion device, means
75 adapting said barring mechanism to trip said stop motion into action, and means for reversing the movement of said work carrier without reversing the movement of the barring mechanism.

11. In combination in a button-hole ma-
80 chine, a stitch forming mechanism for making the button-hole stitches, a feeding mechanism, a barring mechanism including an intermittent circularly moving part
85 which is operated separately from said feeding mechanism, means for operating said barring mechanism at a higher rate of speed than said feeding mechanism, a stop motion device, and means adapting a part of said
90 barring mechanism to trip said stop motion device into action.

12. A button-hole machine comprising a vertically reciprocating and laterally vibrat-
95 ing needle, means for changing the extent of the lateral vibrations of said needle comprising a lever that is periodically turned on its pivot, a stop motion, and a connection be-
100 tween said stop motion and said lever whereby the stop motion is tripped into action from the movement of the lever.

13. A button-hole machine comprising a stitch forming mechanism having a plurality
105 of needles for simultaneously stitching both sides of a button-hole, a work-carrier adapted to cooperate with said stitch forming mechanism, a toothed rack carried by said work-carrier, a gear wheel adapted to engage said rack, means for actuating said gear
110 wheel during the stitching of a button-hole, and means adapted to reverse the movement of said gear wheel and thereby return said work-carrier to its initial position.

14. In combination in a button-hole ma-
115 chine, a feed mechanism comprising a work carrier, means for operating said work-carrier comprising a toothed rack, a toothed wheel for engaging said rack, means for oper-
120 ating said toothed wheel in one direction comprising a feed wheel, means for operating said toothed wheel in the opposite direction
125 comprising a spring and a stitch forming mechanism having a plurality of needles adapted to cooperate with said work-carrier during the movement of the same by said
toothed wheel and simultaneously stitch both sides of a button-hole.

15. In combination in a button-hole sew-

ing machine, a feed mechanism comprising a work-carrier, means for moving said work-carrier longitudinally of a button-hole comprising a toothed rack, and a toothed wheel in engagement with it, a spring adapted to reverse the movement of said toothed wheel and thereby reverse the work-carrier to its initial position, means for turning said toothed wheel against the action of said spring and thereby move the work-carrier in one direction, and a stitch forming mechanism having a plurality of needles for simultaneously stitching both sides of a button-hole during the said movement in one direction of the work-carrier.

16. A button-hole sewing machine comprising a work-carrier, means for operating said work carrier including a feed wheel, a clutch intermediate said feed wheel and said work-carrier, a stitch forming mechanism provided with a plurality of needles adapted to simultaneously stitch both sides of a button-hole during the movement of said work-carrier in one direction, and means for operating said clutch to release the work-carrier from the movement of the feed wheel when a button-hole has been completed.

17. In combination in a button-hole machine, a feeding mechanism comprising a circularly moving part, a starting device carried by said circularly moving part, a stitch forming mechanism, a barring mechanism that is normally out of action, means adapting said starting device to cause said barring mechanism to act, a stop motion mechanism, and means adapting said barring mechanism to trip said stop motion mechanism into action.

18. In combination in a button-hole machine, a plurality of vertically reciprocating and laterally vibrating needles, a plurality of loopers disposed to revolve in a horizontal plane to cooperate with said needles, means for revolving said loopers a plurality of times to each reciprocation of said needles, a barring mechanism adapted to control the lateral movements of said needles for the barring of a button-hole, and a work moving mechanism including a work carrier adapted to cooperate with said stitch forming mechanism and said barring mechanism so as to complete a button-hole during the movement of said work-carrier in one direction.

19. In combination in a button-hole machine, a work moving mechanism including a work-carrier, two vertically reciprocated and laterally vibrating needles disposed to simultaneously stitch both sides of a button-hole during the movement of said work-carrier in one direction, two loopers adapted to revolve in a horizontal plane, means for revolving said loopers twice to each thrust of said needles, and means for moving said

loopers laterally simultaneously with the lateral movements of said needles.

20. In combination in a button-hole sewing machine, a feed mechanism comprising a device for clamping the work, a feed wheel, a connection between the said wheel and the clamp comprising a clutch, means for operating the aforesaid clamp combined with means whereby when the clamp is opened the clutch is operated.

21. In combination in a button-hole sewing machine, a feed mechanism comprising a work-carrier; means for operating said work-carrier comprising a feed wheel attached to a shaft; a pinion loosely mounted on the said shaft; a clutch, one member of which is attached to said pinion and a second member of which is mounted on said shaft and adapted to move longitudinally of the same; a second shaft; a toothed segment attached to the second shaft; and a connection between said toothed segment and the said work-carrier.

22. In combination in a button-hole sewing machine, a feed mechanism comprising a feed wheel; and means for operating the said feed wheel comprising the following elements; an operating pawl adapted to engage the feed wheel, a device to automatically regulate the engagement between the pawl and the wheel, means for operating the said device comprising a cam, and means for automatically bringing said cam into action at a predetermined point in the stitching of a button-hole.

23. In combination in a button-hole sewing machine, a feed mechanism comprising a work-carrier, means for operating the said work-carrier comprising a ratchet wheel, means for regulating the movement of the said ratchet wheel comprising a second ratchet wheel, and means for bringing the said second ratchet wheel into action at a predetermined point in the stitching of a button-hole.

24. In combination in a button-hole sewing machine, a feed mechanism comprising a work-carrier, means for operating the said work-carrier comprising a feed wheel, means for regulating the movements of the said feed wheel comprising a ratchet wheel having a gap in the teeth thereof, an actuating pawl normally out of engagement with the teeth of the ratchet wheel, and means for turning the ratchet wheel into engagement with the pawl.

25. In combination in a button-hole sewing machine, a feed mechanism comprising a work-carrier; a feed wheel and means for operating the same; a connection between the said feed wheel and the work-carrier, comprising a clutch and a shaft, one member of said clutch being keyed on the said shaft

and thereby adapted to move longitudinally of the same, and a groove being formed in one extreme of the said clutch; a bell crank lever coöperating with the movable member of the clutch; a pinion and a connection between the pinion and the work-carrier; and means for operating the bell-crank lever.

26. In combination in a button-hole sewing machine, a feed mechanism comprising a work-carrier; and means for moving the said work-carrier comprising the following instrumentalities:—a shaft; a toothed feed wheel attached to said shaft; means for operating the said feed wheel; a pinion suitably mounted; means intermediate the pinion and the shaft whereby the pinion is operated from the movement of the shaft; a second shaft; a segment, the diameter of which is larger than that of the pinion, mounted on said second shaft; a second pinion, the diameter of which is less than that of the segment, mounted on the second shaft; and a toothed rack attached to the work-carrier and in engagement with the said second pinion.

27. A button-hole sewing machine comprising a stitching mechanism for simultaneously binding both sides of a button-hole; a feeding mechanism including a work-carrier; a barring mechanism; means for actuating the several mechanisms, means whereby the feeding mechanism throws the barring mechanism into operation; and means for reversing the movement of the work-carrier at the end of a feeding operation.

28. In combination in a button-hole sewing machine, a feed mechanism comprising a slide, a device for moving the slide in one direction longitudinally of the button-hole, a spring for moving the slide in the opposite direction, means for limiting the movement of the slide through the action of a spring comprising a projection 52 extending downwardly from the said slide, a screw 24 passing through the said projection, and the abutment 25.

29. A button-hole sewing machine comprising a feeding mechanism, including a work-clamp, a clutch, and a feed wheel; means connecting the wheel and clutch; means connecting the clamp and clutch; and means for opening the clamp and clutch simultaneously and thereby rendering the feed wheel ineffective.

30. In combination in a button-hole sewing machine, a feed mechanism comprising a work-carrier and a clamp, a feed wheel, and a clutching device intermediate the feed wheel and the work-carrier; a device for opening the work clamp; and means whereby, when the said device for opening the said clamp is operated, the said clutch is opened.

31. In combination in a button-hole sewing machine, a feed mechanism comprising a

work-carrier, a feed wheel and a clutching device intermediate the feed wheel and the work-carrier; the link 44, the roller 43, and the bell-crank lever 38; the connection between the bell crank lever and the clutching device, whereby the clutching members of the latter are disengaged when the link 44 is moved downward; and the spring for bringing the said clutching member again into engagement.

32. In combination, a stitch forming mechanism for simultaneously binding both sides of a button-hole; a feeding mechanism; a barring mechanism; a stop mechanism; means for actuating the barring mechanism from the feeding mechanism; and means for actuating the stop mechanism from the barring mechanism.

33. A button-hole sewing machine comprising stitch forming mechanism; a feeding mechanism including a clutch, a cloth clamp and means for holding the latter normally open; a bar normally bearing upon the clamp for closing the same; means connecting the bar and clutch; and a device for operating the connecting means to open the clutch and permit the clamp to automatically open.

34. A button-hole machine comprising a stitch forming mechanism, a feed wheel, a barring mechanism, a cam for operating said barring mechanism the axis of which is in line with the axis of the feed wheel, means for periodically operating said cam, a stop motion mechanism, and means whereby said stop motion mechanism is tripped into action from the movement of said cam.

35. A button-hole machine comprising a stitch forming mechanism, a feed mechanism including a feed wheel and a work carrier, a barring mechanism, a clutch device intermediate the feed wheel and the work carrier, a stop motion mechanism, and means intermediate the stop motion mechanism and the barring mechanism whereby the former is tripped into action by the latter.

36. A button-hole machine comprising a stitch forming mechanism adapted to simultaneously stitch both sides of a button-hole, a feeding mechanism comprising a circularly moving part, a starting device carried by said circularly moving part, means for adjusting said starting device around the axis of said circularly moving part, a stop motion device, and means intermediate the same and said starting device whereby the stop motion is tripped into action from the movement of said intermediate means.

37. A button-hole machine comprising a stitch forming mechanism, a feeding mechanism having a feed wheel and a gear wheel, a barring mechanism including an intermit-

tently rotating wheel that is normally out of action, an adjustable part carried by said gear wheel adapted to turn said barring mechanism wheel into action, a stop motion
5 device, and means operated from the movement of said barring mechanism wheel for tripping said stop motion into action.

Signed at New York in the county of New York and State of New York this fifteenth day of December A. D. 1900.

WILLIAM N. PARKES.

Witnesses:

R. C. BOSWELL,

JOHN P. COHALAN.