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J. K. BIGELOW.

MACHINE FOR FORMING LOOPS.

No. 537,913. Patented Apr. 23, 1895.

Fig. 2.

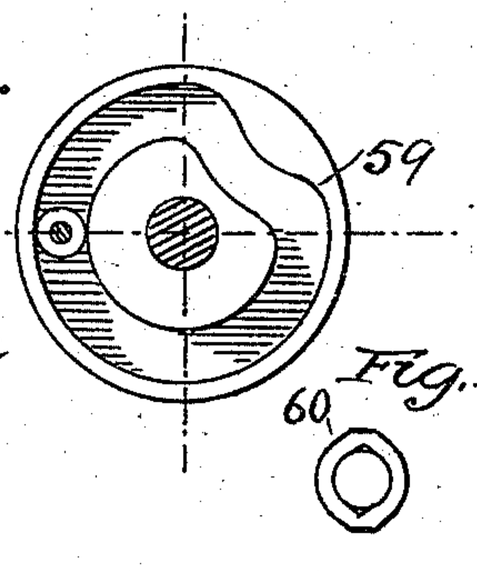
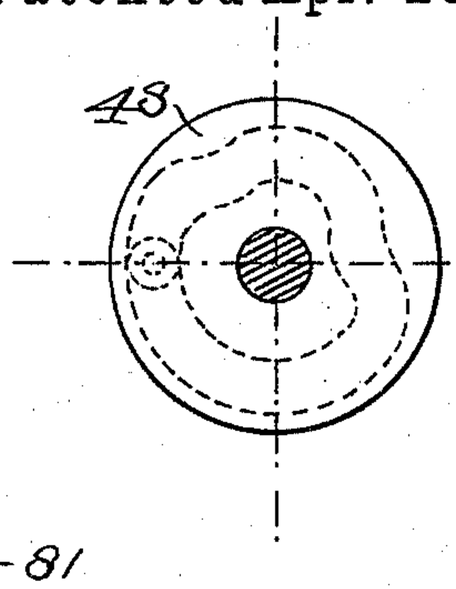


Fig. 1a

Fig. 1b

Fig. 3.



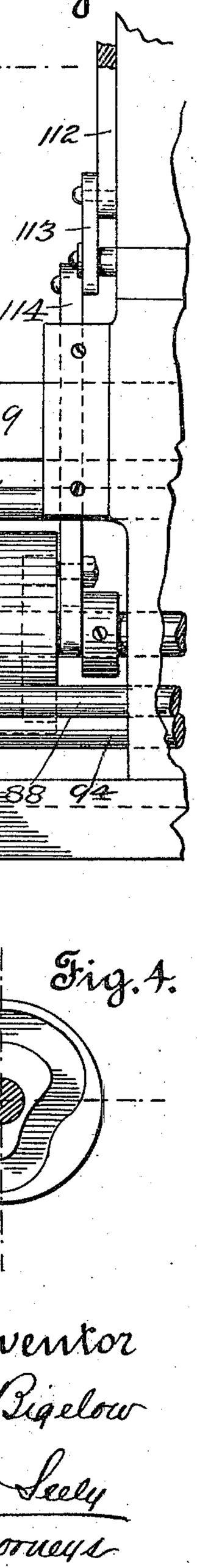


Fig. 1.

Fig. 4.

Fig. 5.

Witnesses.

H. Hunteveldt.

M. R. Bryan

Inventor

John K. Bigelow

by Spear & Seely

Attorneys

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J. K. BIGELOW.

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Fig. 7.

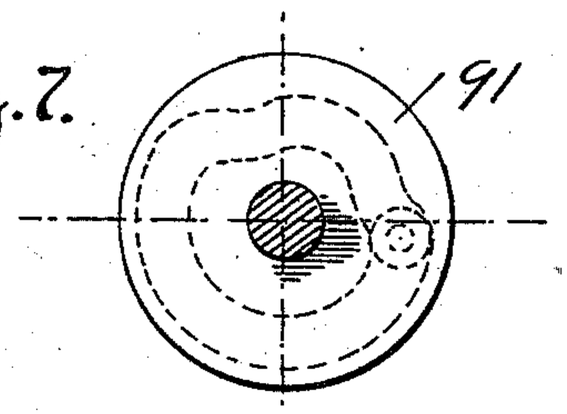

Fig. 6.

Fig. 8.

Witnesses.

F. Hartenerdt.

W. R. Bryan

Inventor.

John K. Bigelow

by Spear & Seely

Attorneys

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J. K. BIGELOW.

MACHINE FOR FORMING LOOPS.

No. 537,913. Patented Apr. 23, 1895.

Fig. 9.

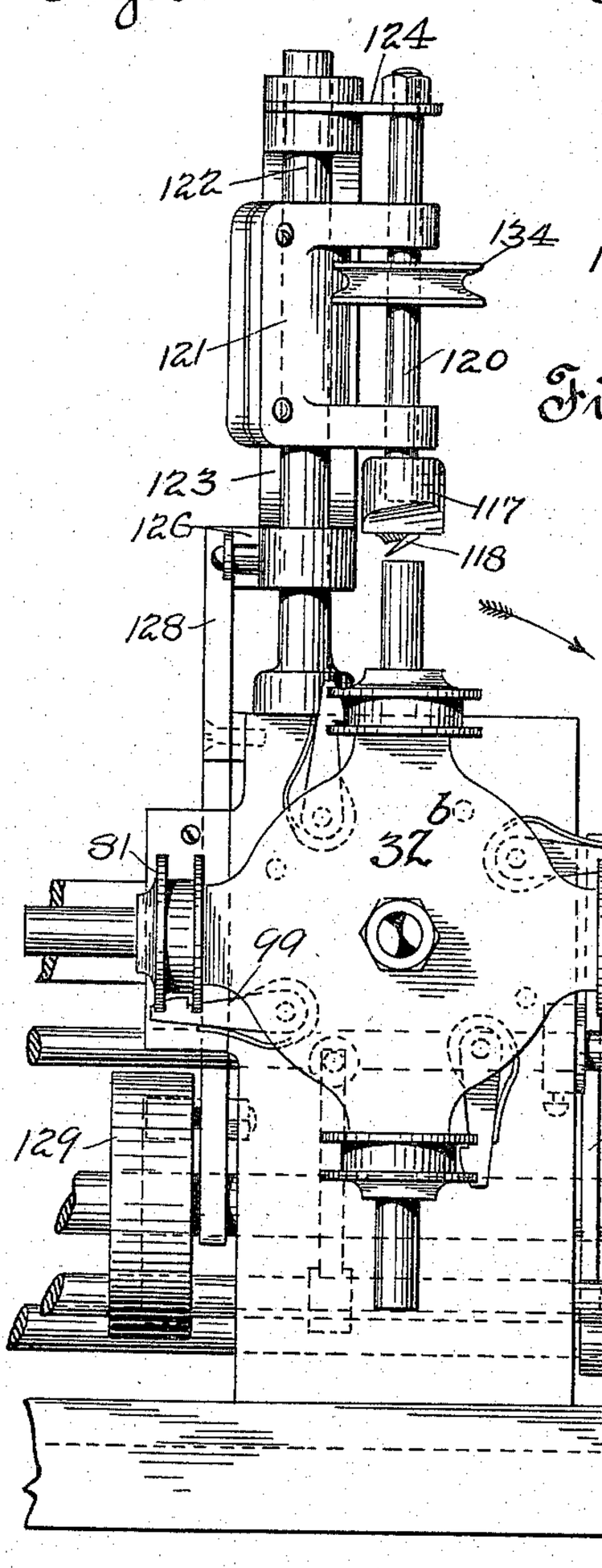


Fig. 10.

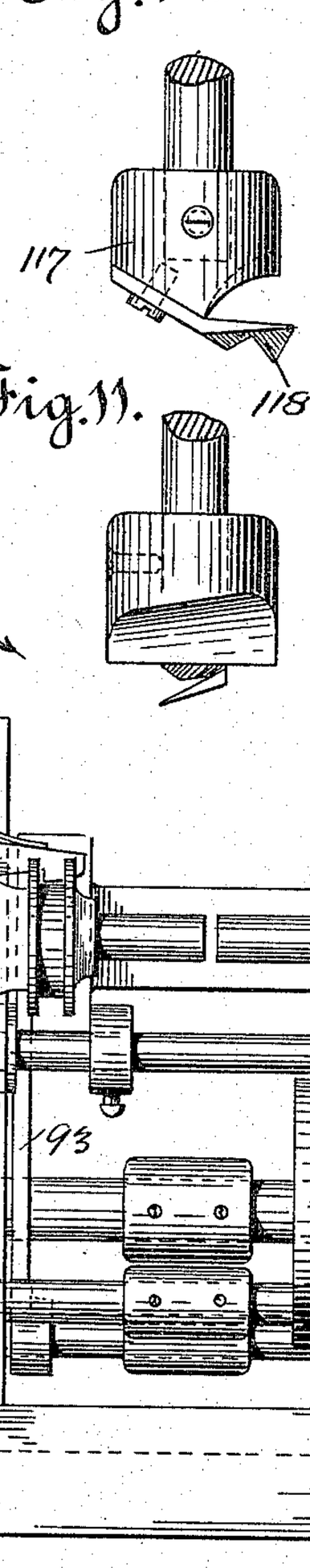
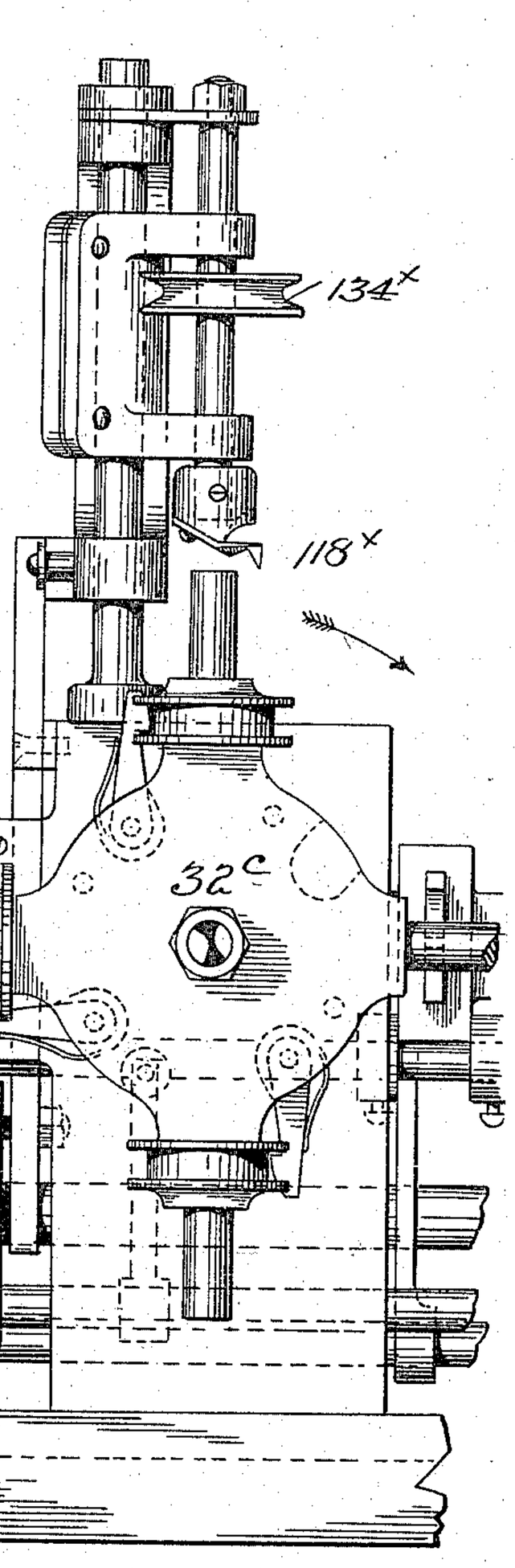


Fig. 11.

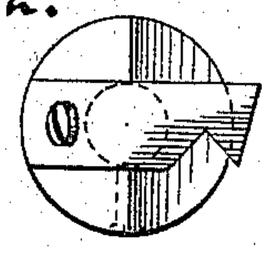


Witnesses.

F. Montenerde,

M. R. Bryan

Fig. 12.



Inventor.

John K. Bigelow

by Spear & Seely

Attorneys

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J. K. BIGELOW.

MACHINE FOR FORMING LOOPS.

No. 537,913. Patented Apr. 23, 1895.

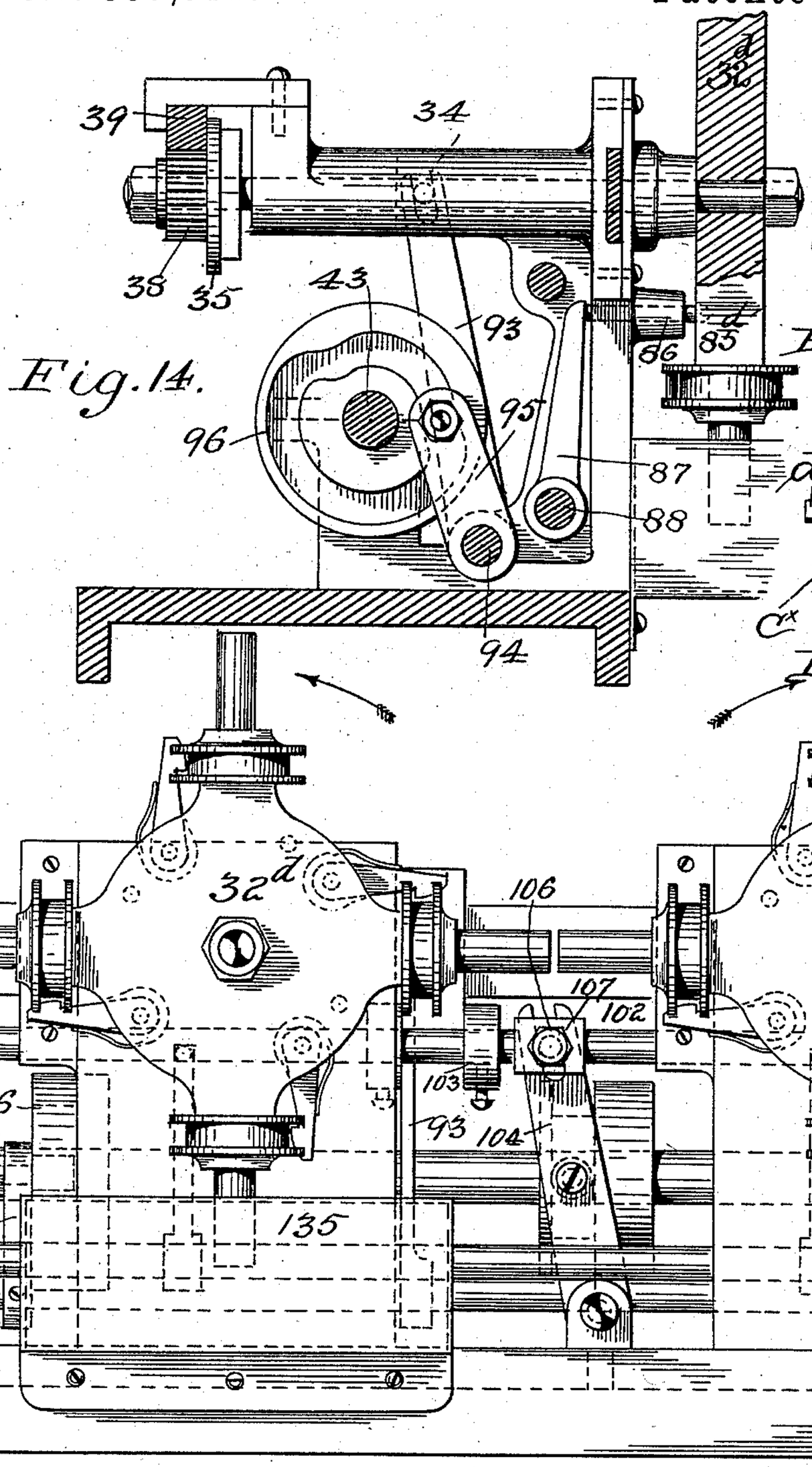
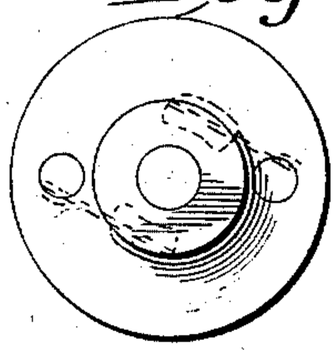


Fig. 14.

Fig. 13.

Fig. 13a.



Witnesses.

F. Hollontenerde.

M. R. Bryan

Inventor.

John K. Bigelow

by Spear & Seely

Attorneys.

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J. K. BIGELOW.

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Fig. 16.

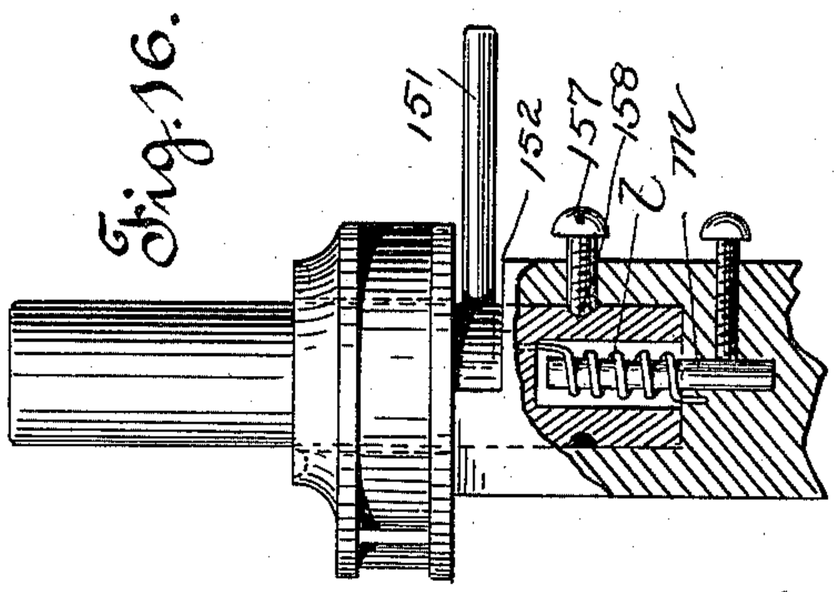

Fig. 15.

Witnesses.
Fitzinteverde.
M. R. Bryan

Inventor.
J. K. Bigelow
by Spear & Seely
Attorneys

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J. K. BIGELOW.

MACHINE FOR FORMING LOOPS.

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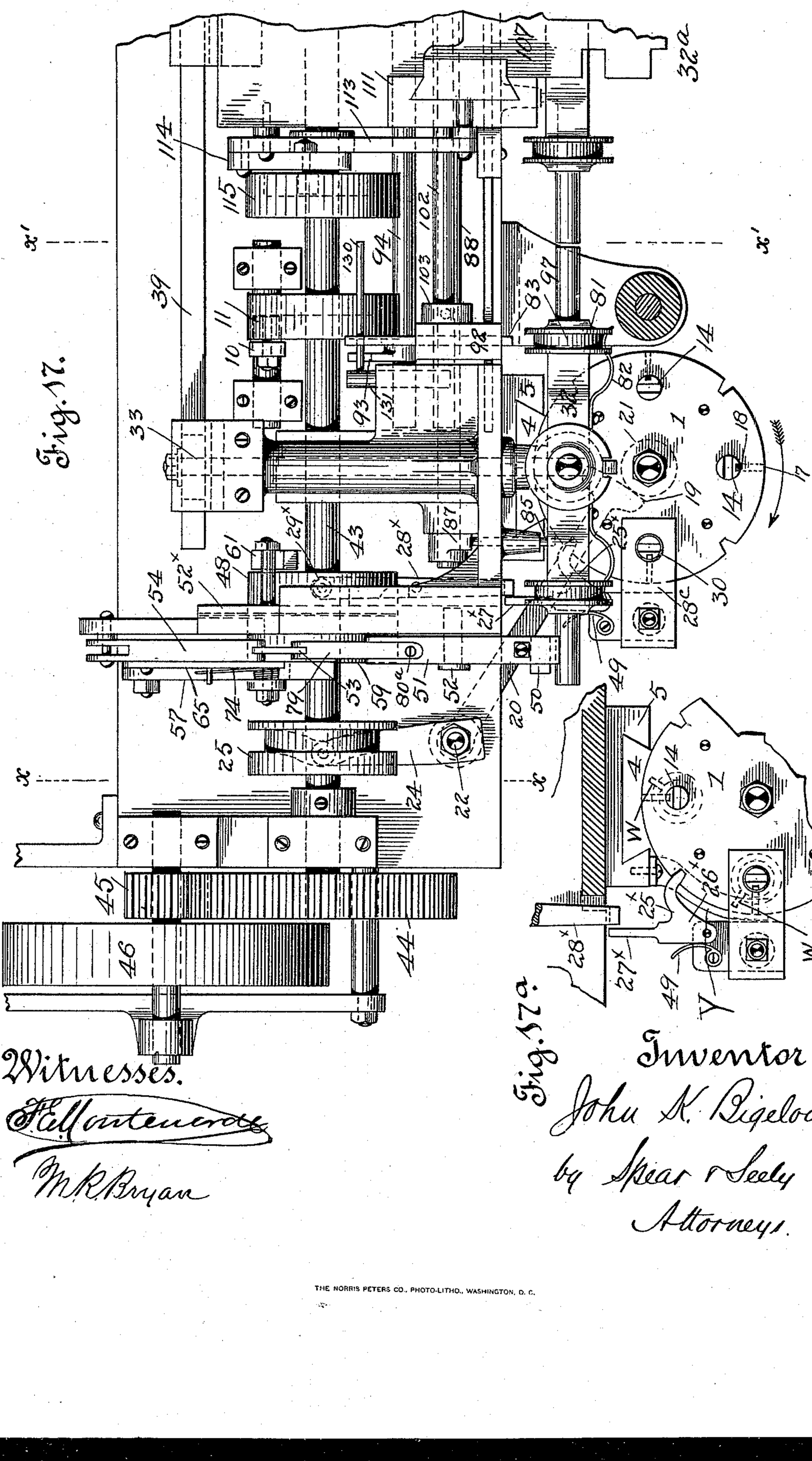

Fig. 17.

Fig. 17a.

Witnesses.

F. Ellis Contenardo

M. R. Bryan

Inventor

John K. Bigelow

by Spear & Seely

Attorneys.

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J. K. BIGELOW.

MACHINE FOR FORMING LOOPS.

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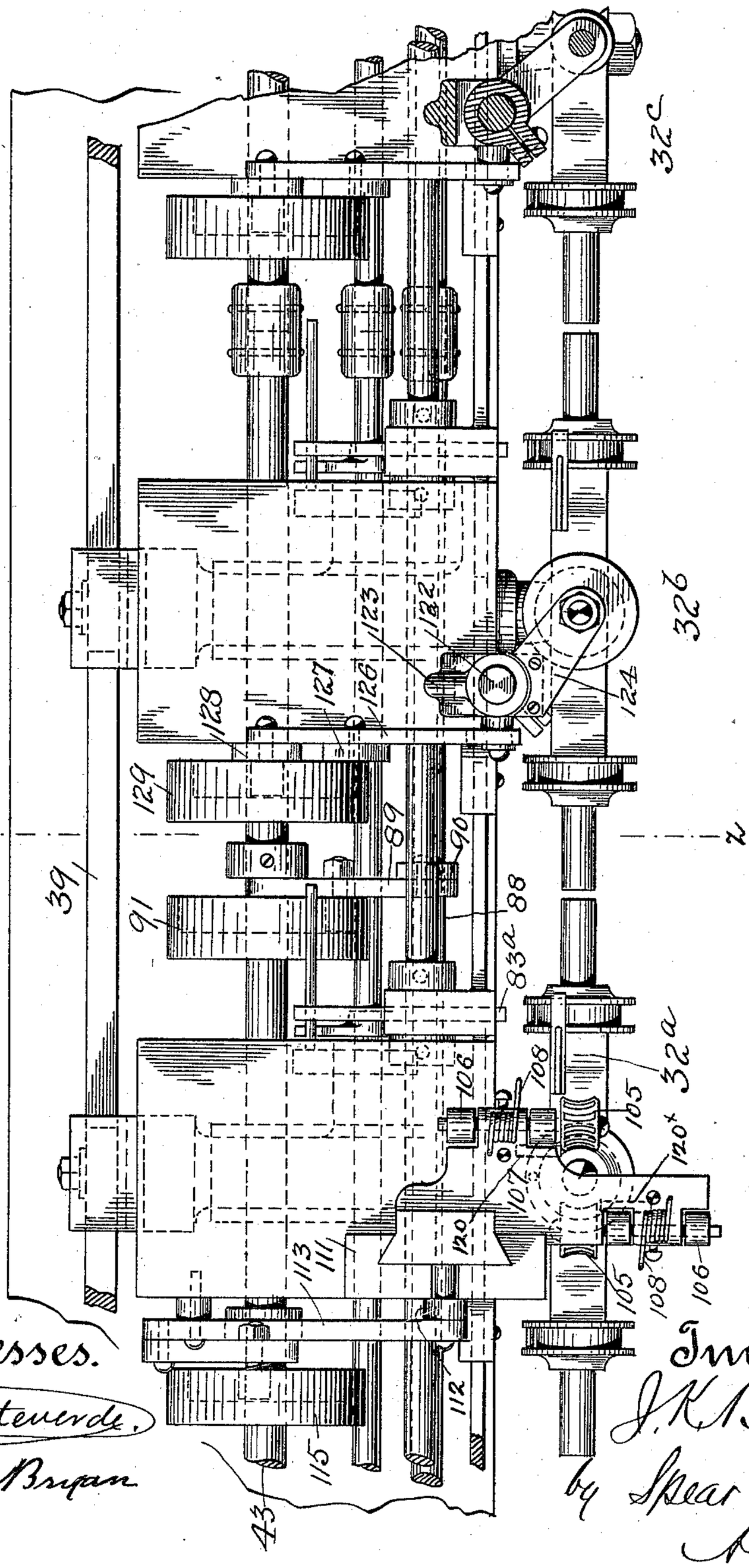

Witnesses.

F. Montevercle.

W. R. Bryan

Inventor.

J. K. Bigelow

by Spear & Seely

Attorneys

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J. K. BIGELOW.

MACHINE FOR FORMING LOOPS.

No. 537,913. Patented Apr. 23, 1895.

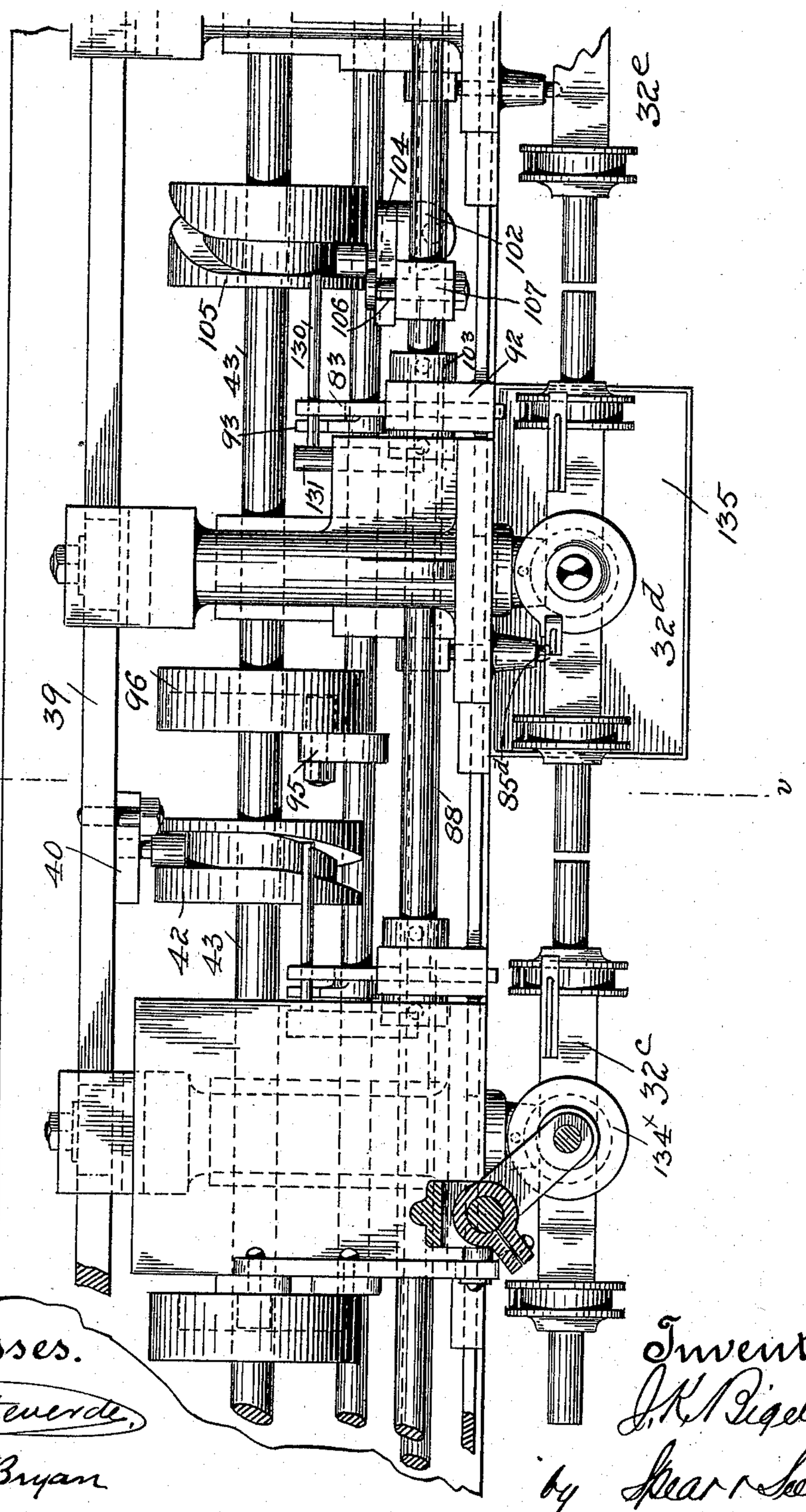

Fig. 19.

Witnesses.
F. L. Montevercle.
M. R. Bryan

Inventor.
J. K. Bigelow
by Shearn Seely
Attorneys

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J. K. BIGELOW.

MACHINE FOR FORMING LOOPS.

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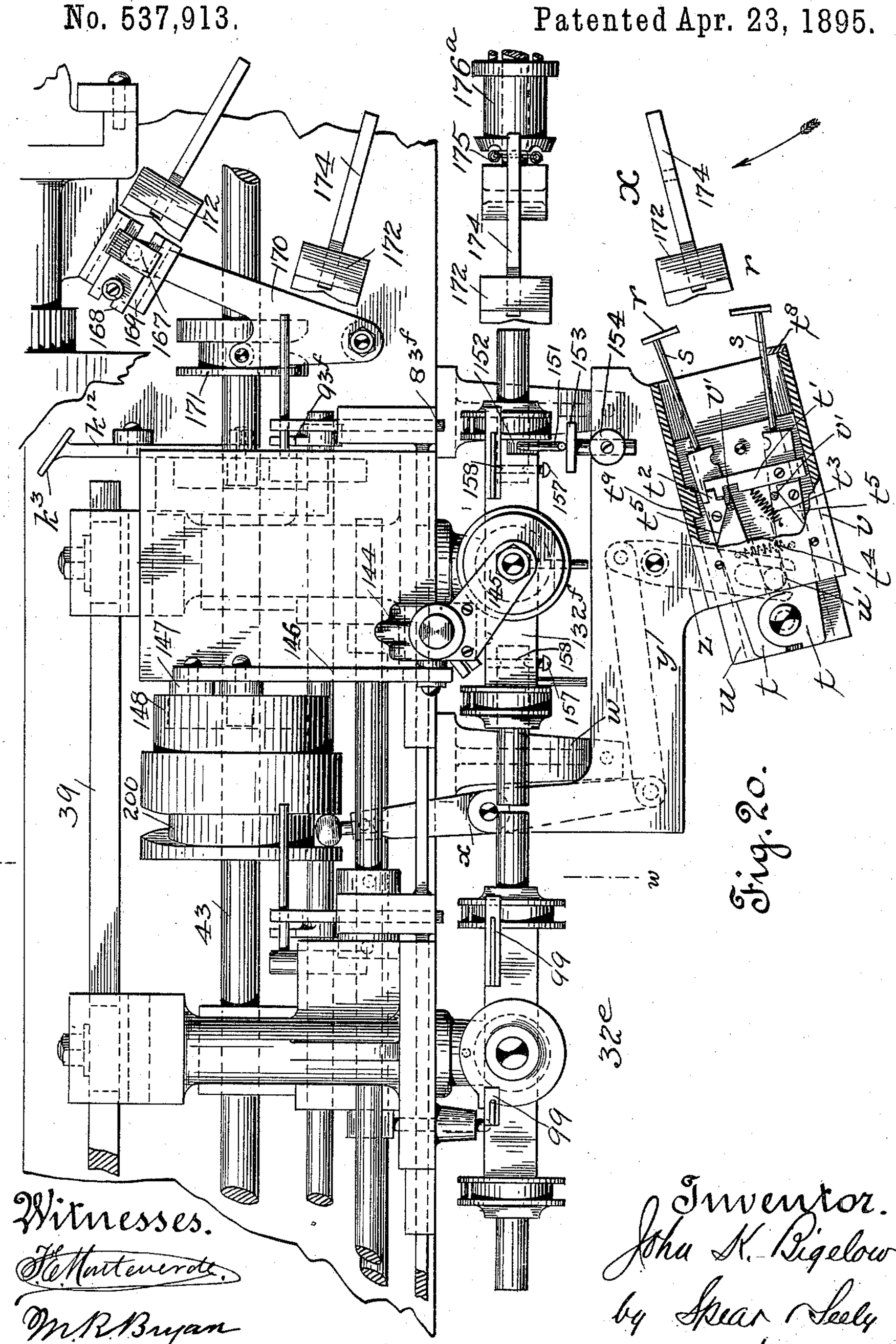

Fig. 20.

Witnesses.
F. E. Mantenerodt.
W. R. Bryan

Inventor.
John K. Bigelow
by Spear & Seely
Attorneys

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J. K. BIGELOW.

MACHINE FOR FORMING LOOPS.

No. 537,913. Patented Apr. 23, 1895.

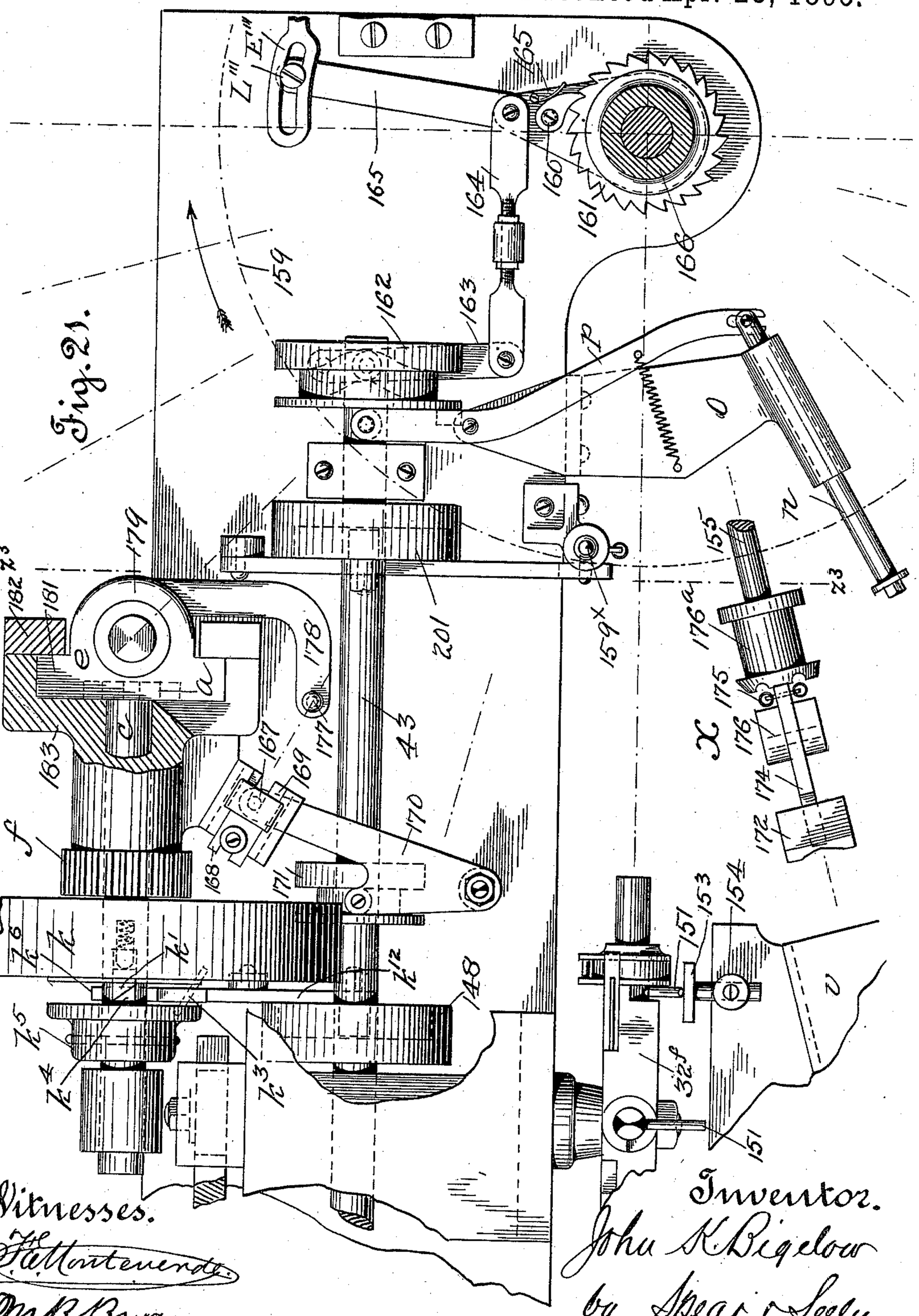

Fig. 21.

Witnesses.
F. A. Gaertner.
W. R. Bryan

Inventor.
John K. Bigelow
by Spear & Seely
Attorneys

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J. K. BIGELOW.

MACHINE FOR FORMING LOOPS.

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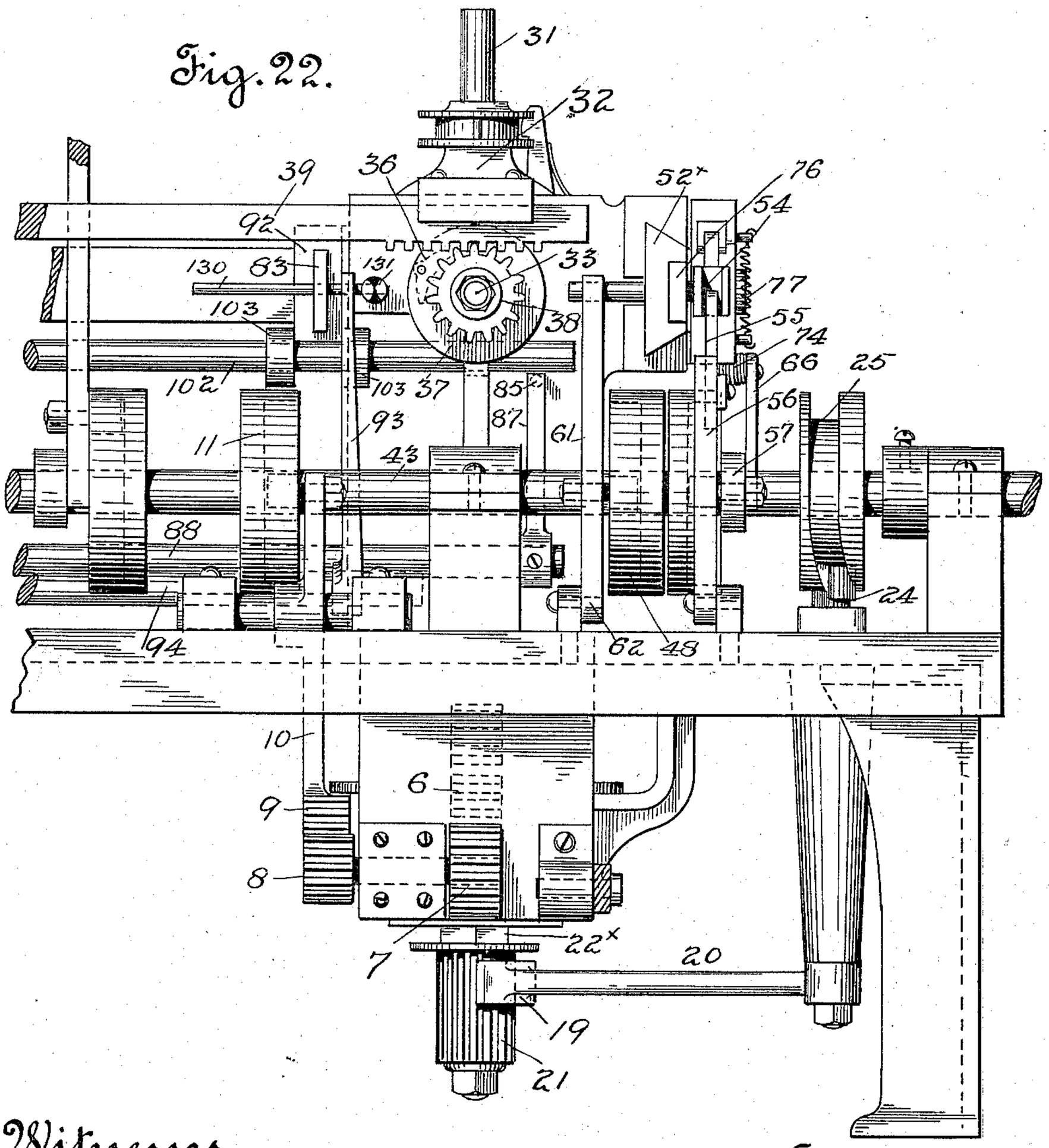
Fig. 22.



Witnesses.

F. L. Montevercle.

W. R. Bryan

Inventor.

John K. Bigelow

by Spear & Seely

Attorneys

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J. K. BIGELOW.

MACHINE FOR FORMING LOOPS.

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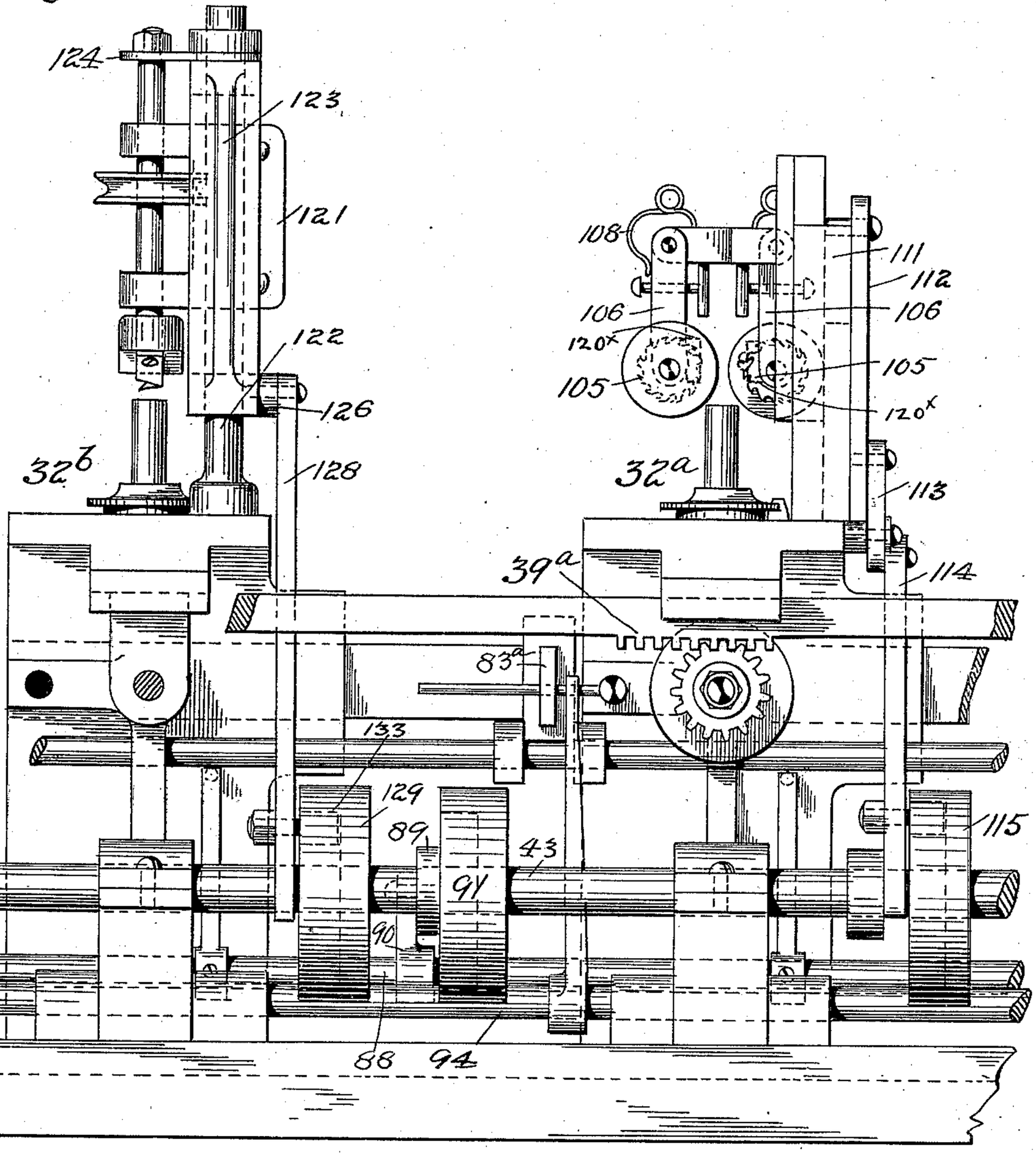
Fig. 23.



Witnesses.

M. R. Bryan

Inventor.

John K Bigelow

by Spear & Seely

Attorneys

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J. K. BIGELOW.

MACHINE FOR FORMING LOOPS.

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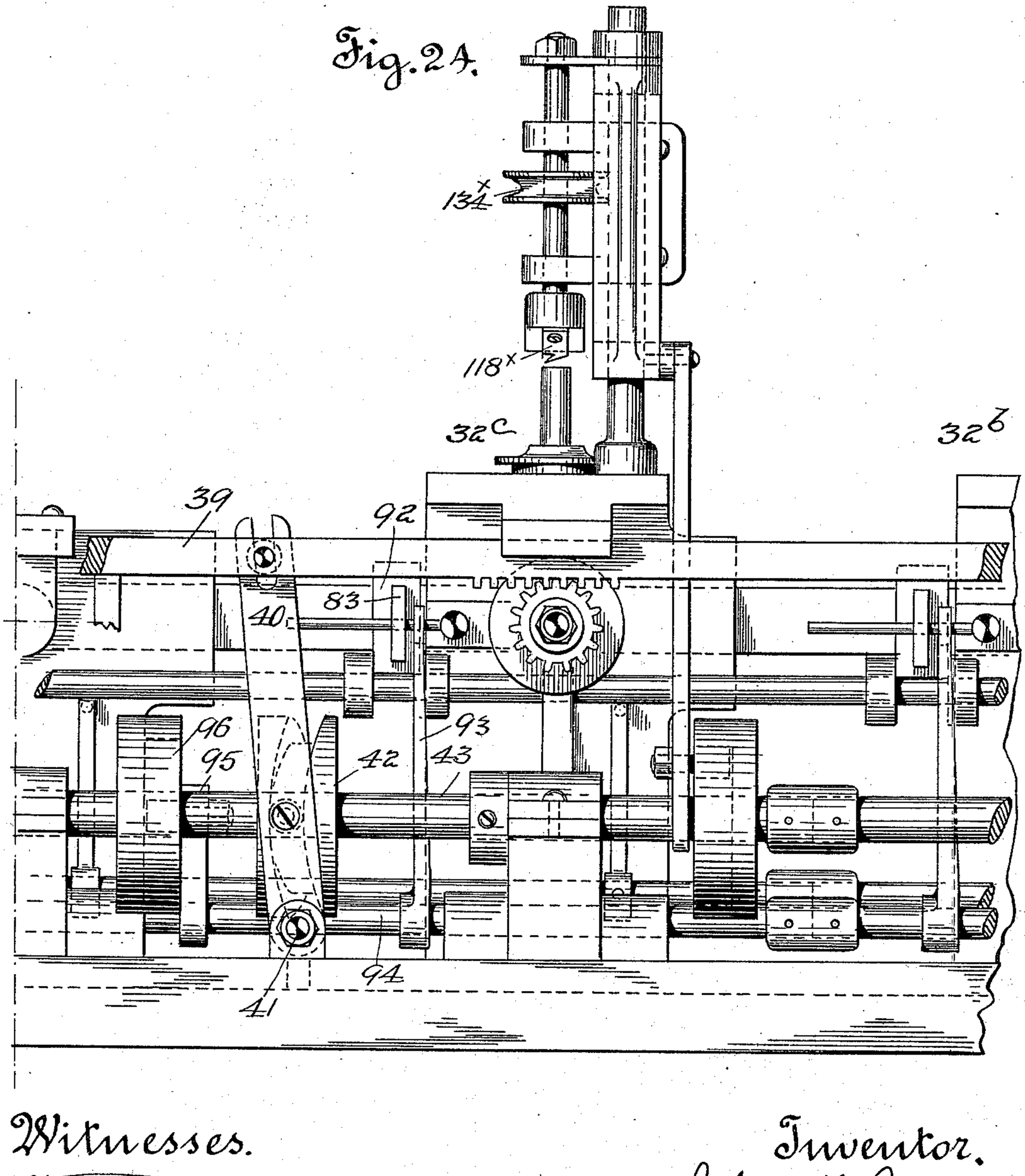
Fig. 24.



Witnesses.
F. Hartenerdt
M. R. Bryan

Inventor.
John K. Bigelow
by Spear & Seely
Attorneys

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J. K. BIGELOW.

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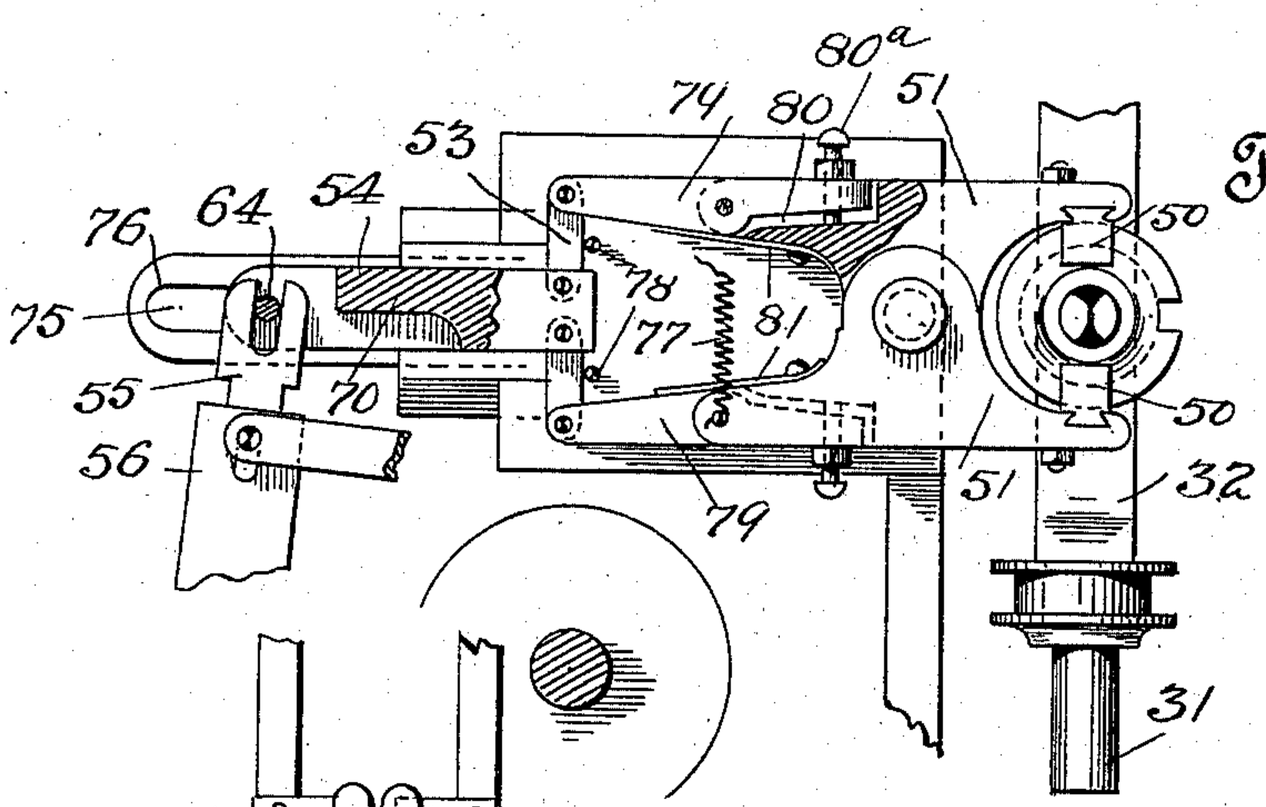

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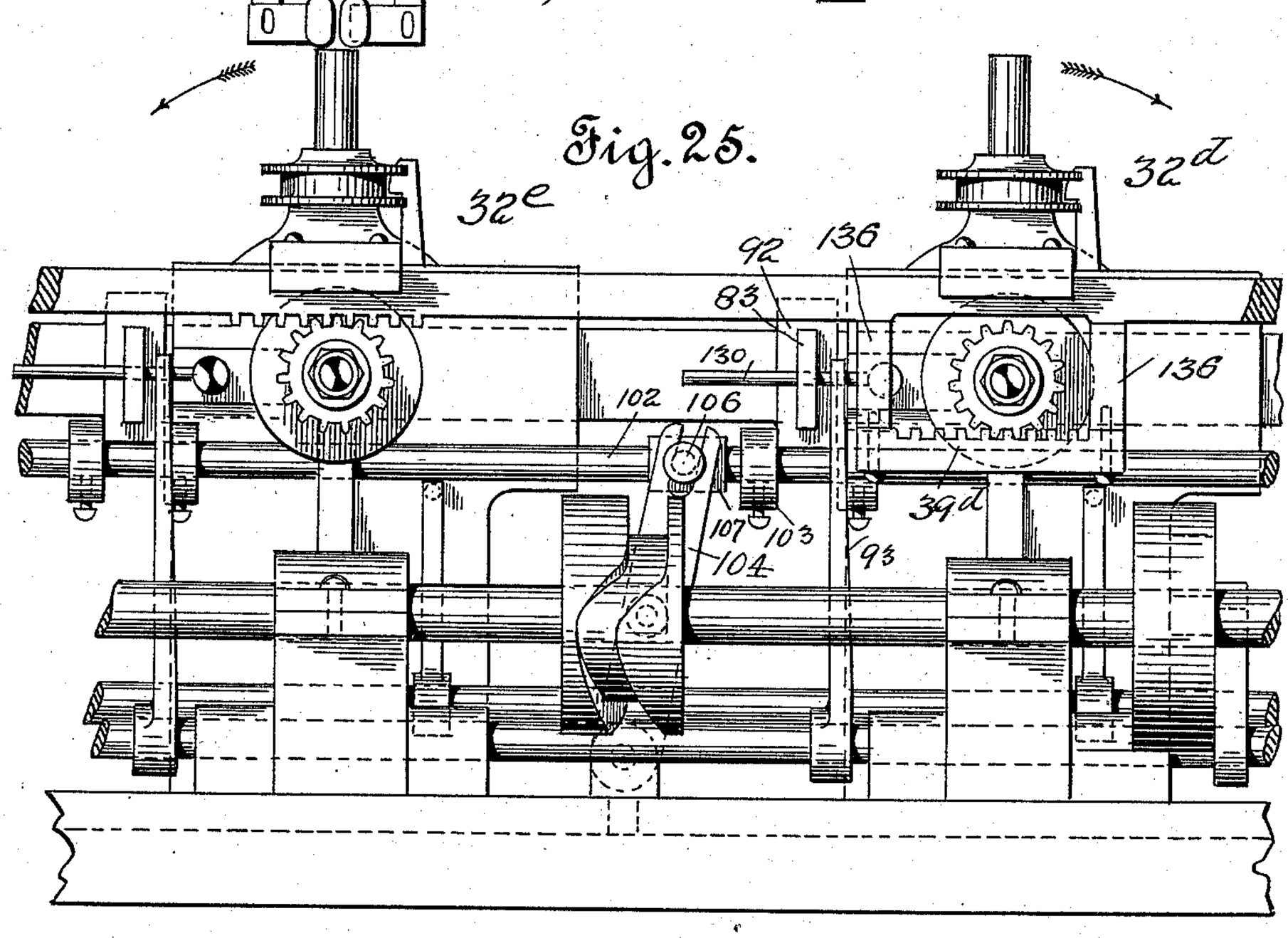

Fig. 25.

Witnesses.
F. Ellis Tenerdt.
M. R. Bryan

Inventor.
John K. Bigelow
by Spear & Seely
Attorneys

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J. K. BIGELOW.

MACHINE FOR FORMING LOOPS.

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Fig. 28.

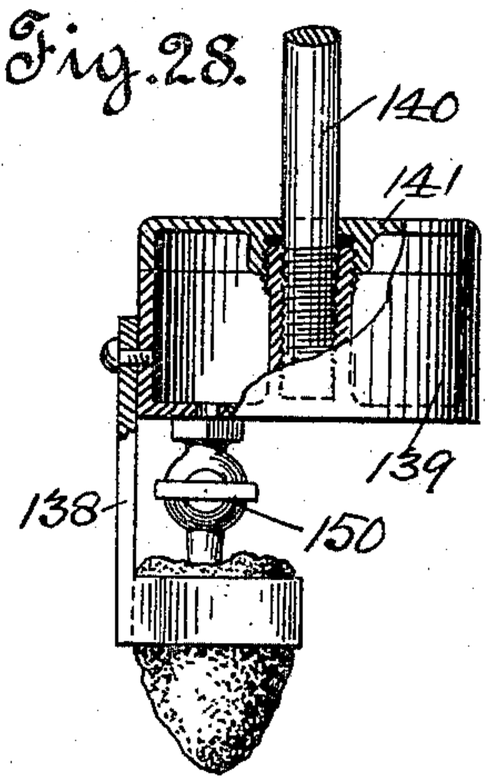
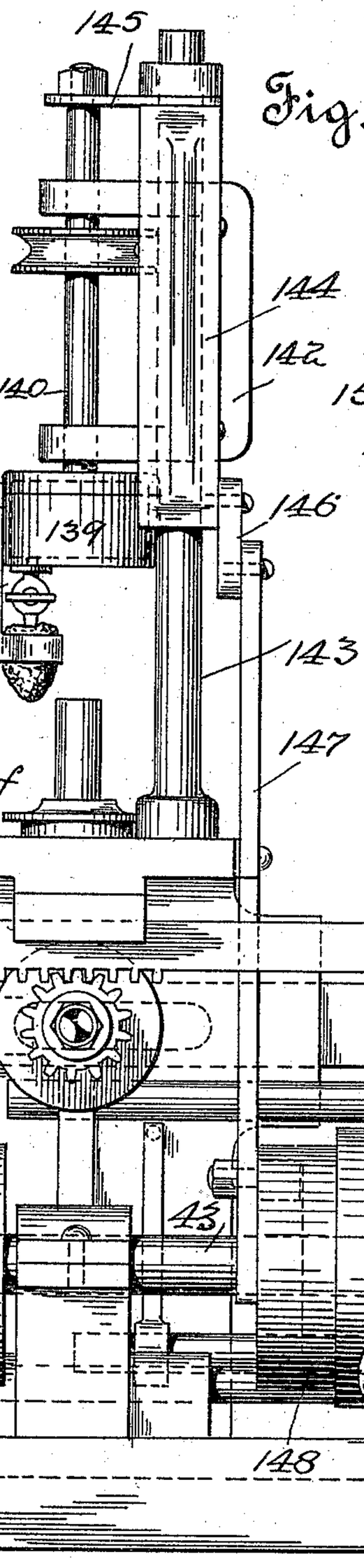


Fig. 27.



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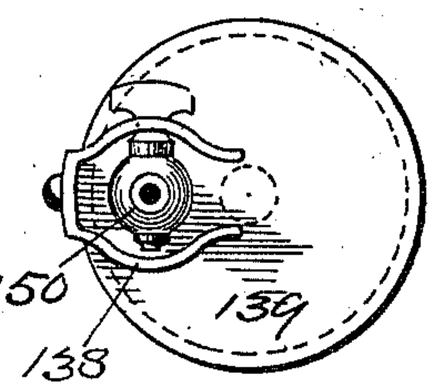

32e

Witnesses.

F. Allan Everett.

M. R. Bryan.

Inventor.

John K. Bigelow

by Spear & Seely

Attorneys

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J. K. BIGELOW.

MACHINE FOR FORMING LOOPS.

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Fig. 30.

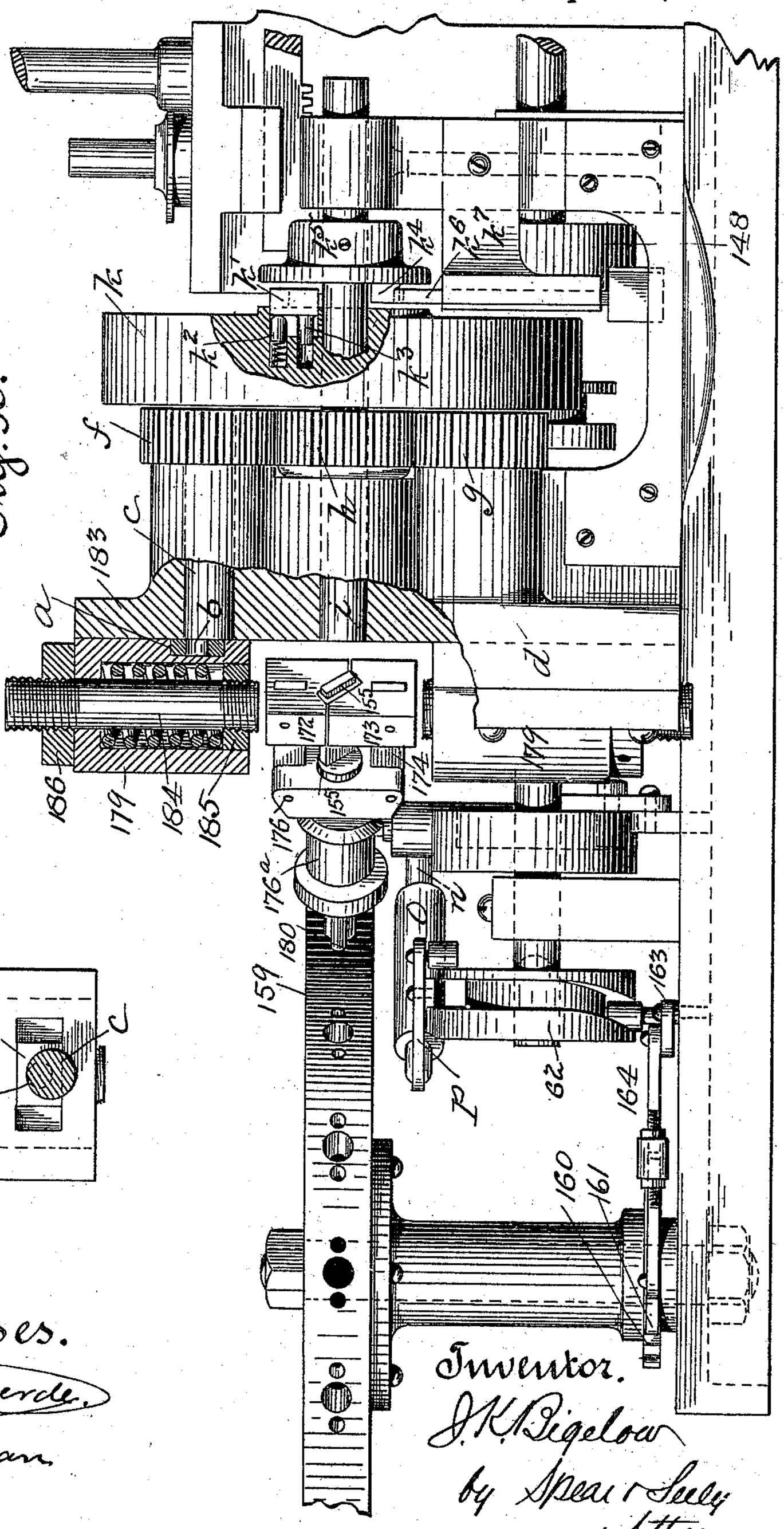
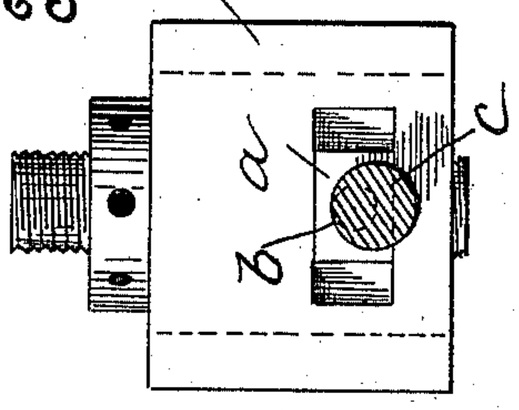


Fig. 31.



Witnesses.

F. Hunteverde.

M. R. Bryan.

Inventor.

J. K. Bigelow

by Spear & Seely

Attorneys.

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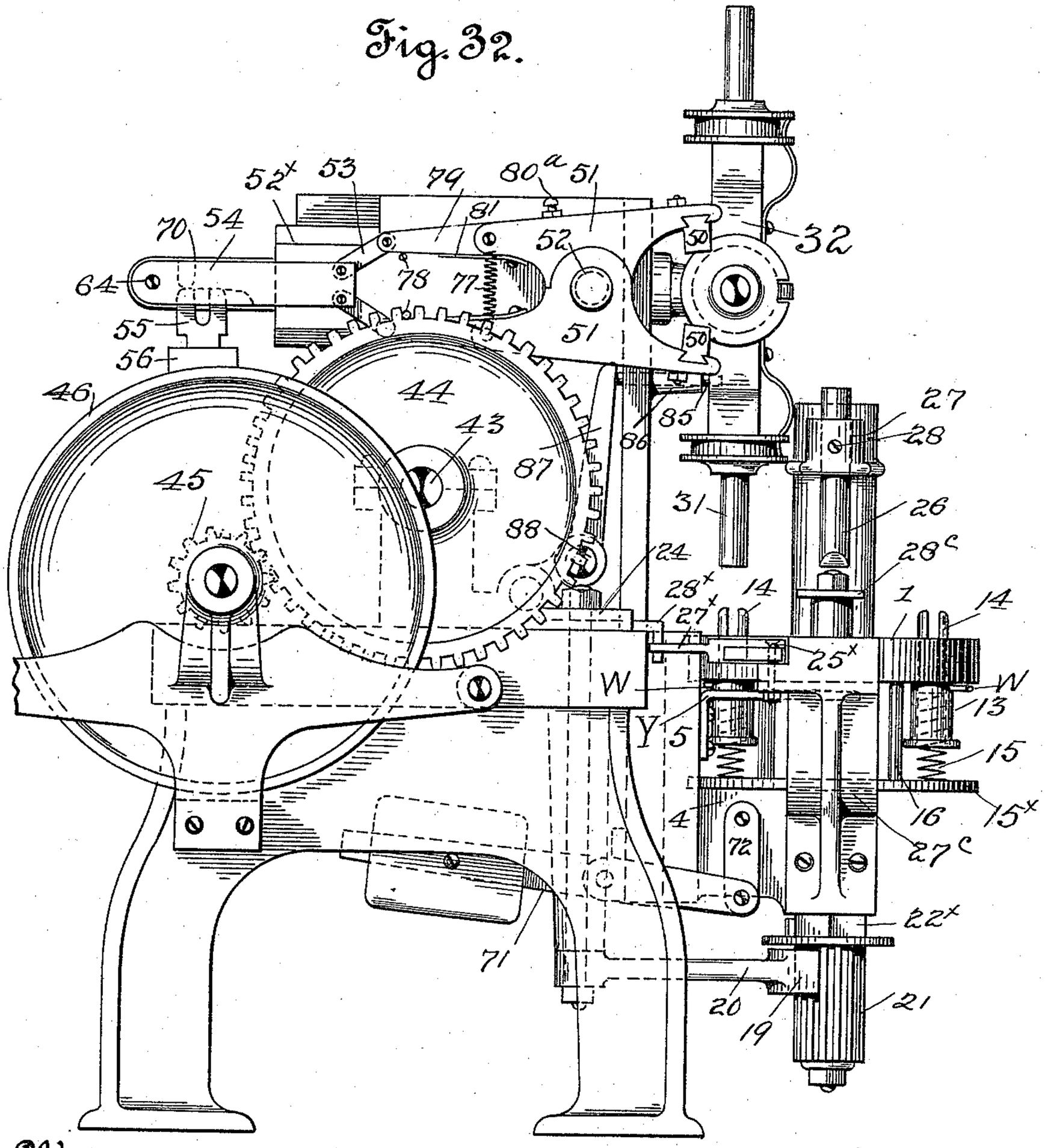
J. K. BIGELOW.

MACHINE FOR FORMING LOOPS.

No. 537,913. Patented Apr. 23, 1895.

Fig. 32.



Witnesses.

F. Hollaniverde

M. R. Bryan

Inventor

John K Bigelow

by Spear & Seely

Attorneys

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J. K. BIGELOW.

MACHINE FOR FORMING LOOPS.

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Fig. 33.

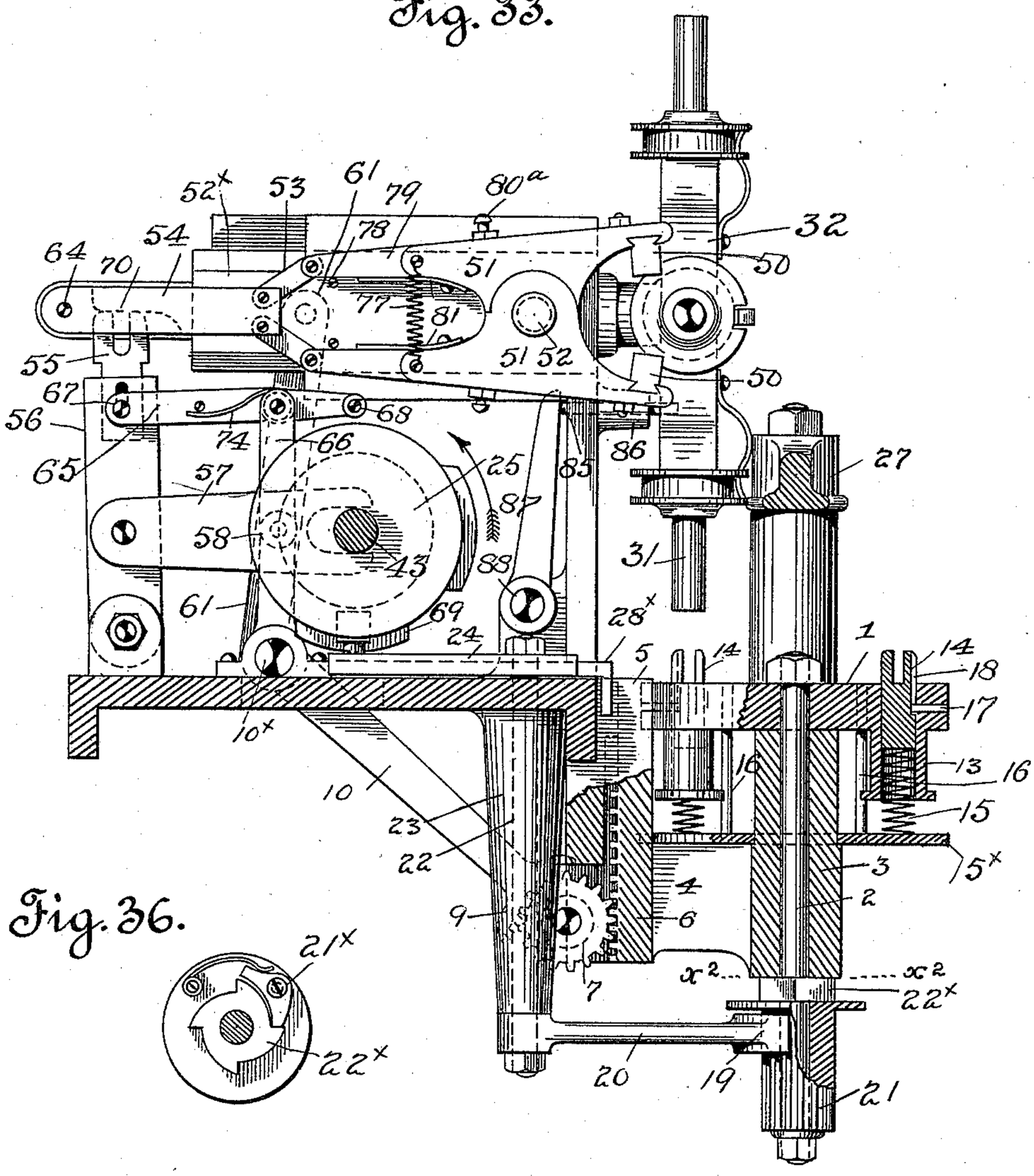

Fig. 36.

Witnesses.

F. Cellarteverde.

W. R. Bryan

Inventor.

John K. Bigelow

by Spear & Seely

Attorneys

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J. K. BIGELOW.

MACHINE FOR FORMING LOOPS.

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Fig. 34.

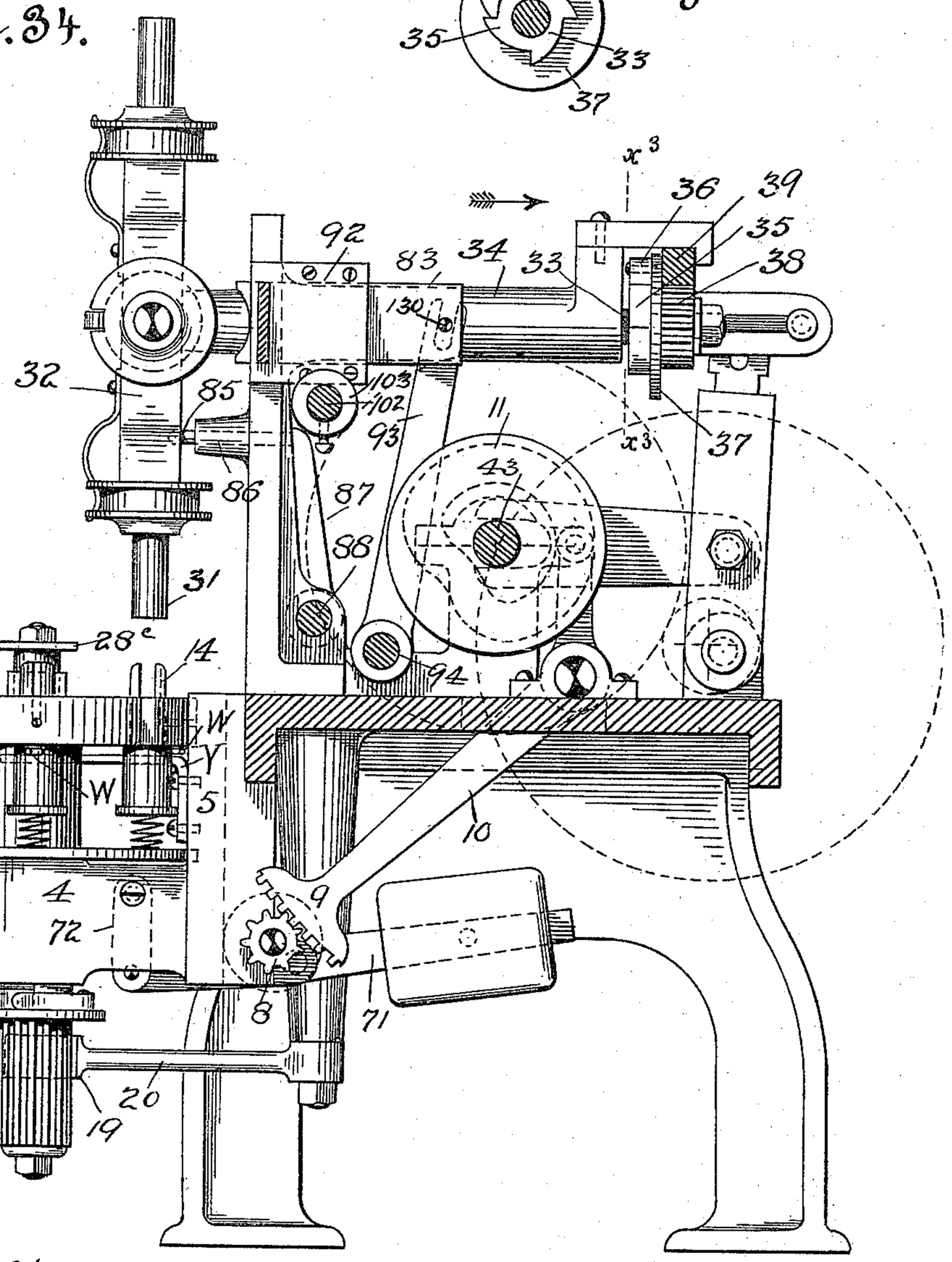

Fig. 35.

Witnesses.

F. A. Wanteverde.

M. R. Bryan

Inventor

John K. Bigelow

by Spear & Seely

Attorneys

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J. K. BIGELOW.

MACHINE FOR FORMING LOOPS.

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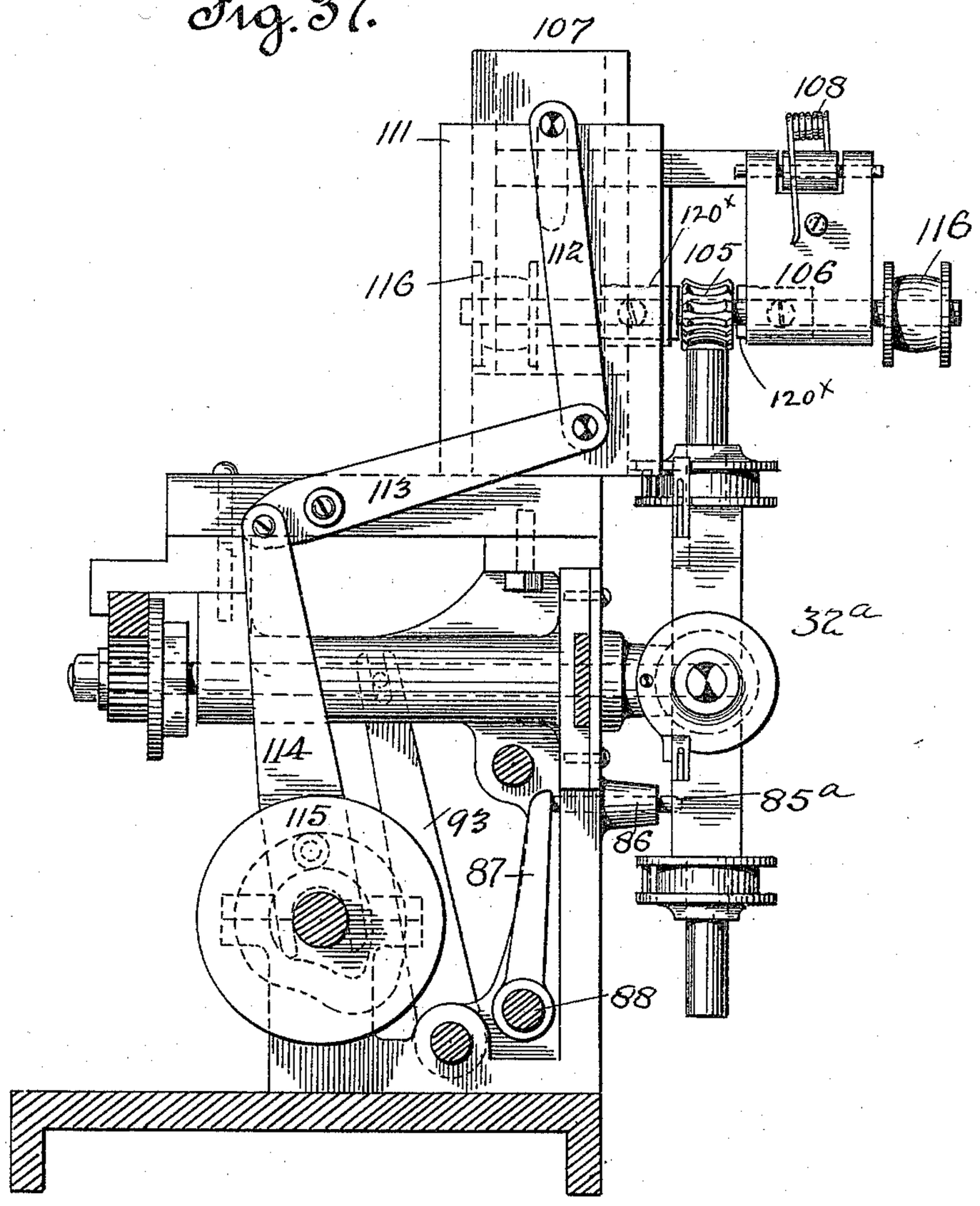
Fig. 37.



Witnesses.
Kattenteurde.
W. R. Bryan.

Inventor.
John K. Bigelow
by Spear & Seely
Attorneys

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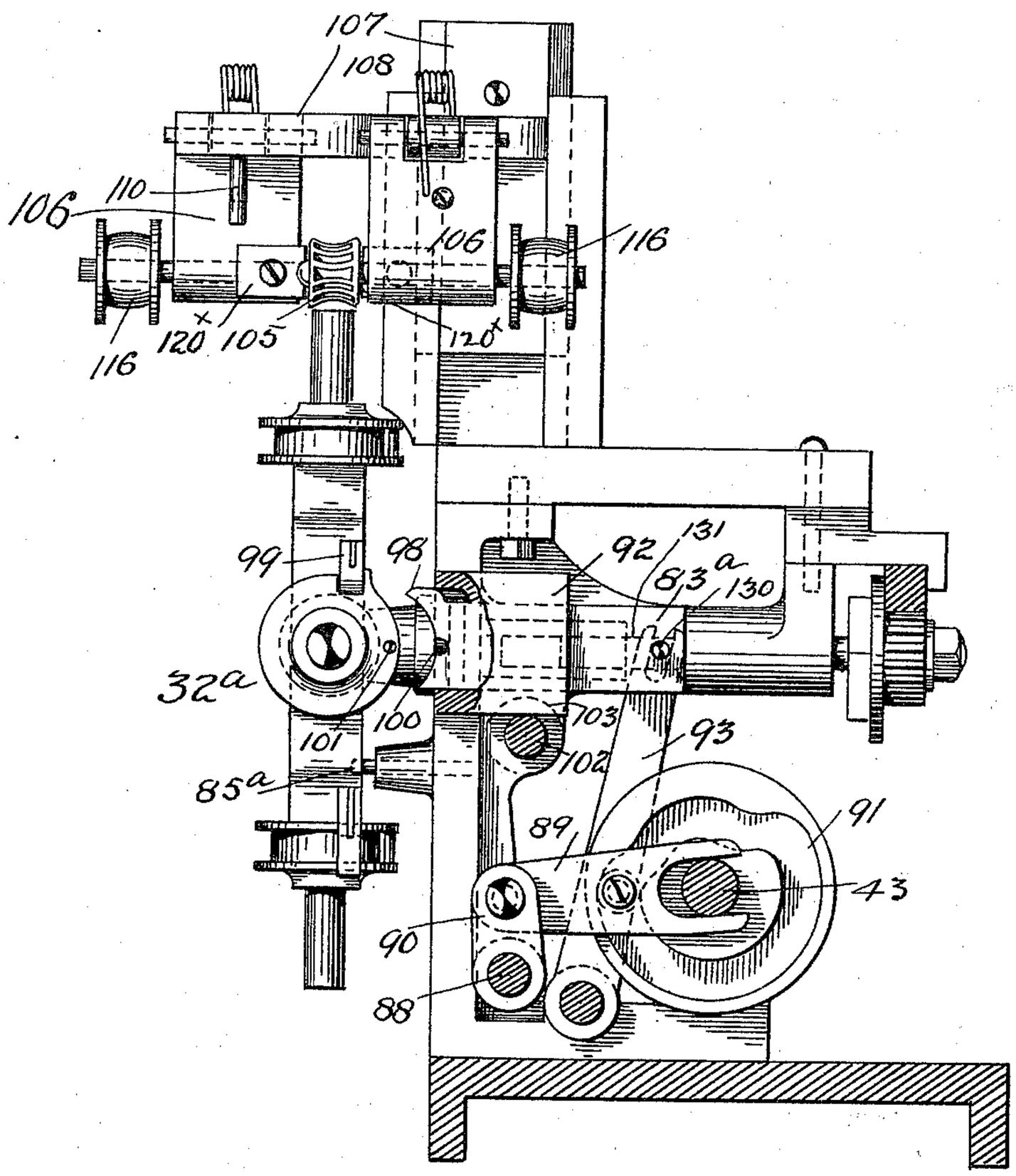
J. K. BIGELOW.

MACHINE FOR FORMING LOOPS.

No. 537,913. Patented Apr. 23, 1895.

Fig. 38.



Witnesses.

F. L. Montevercle.

M. R. Bryan

Inventor.

John K. Bigelow

by Spear & Seley

Attorneys.

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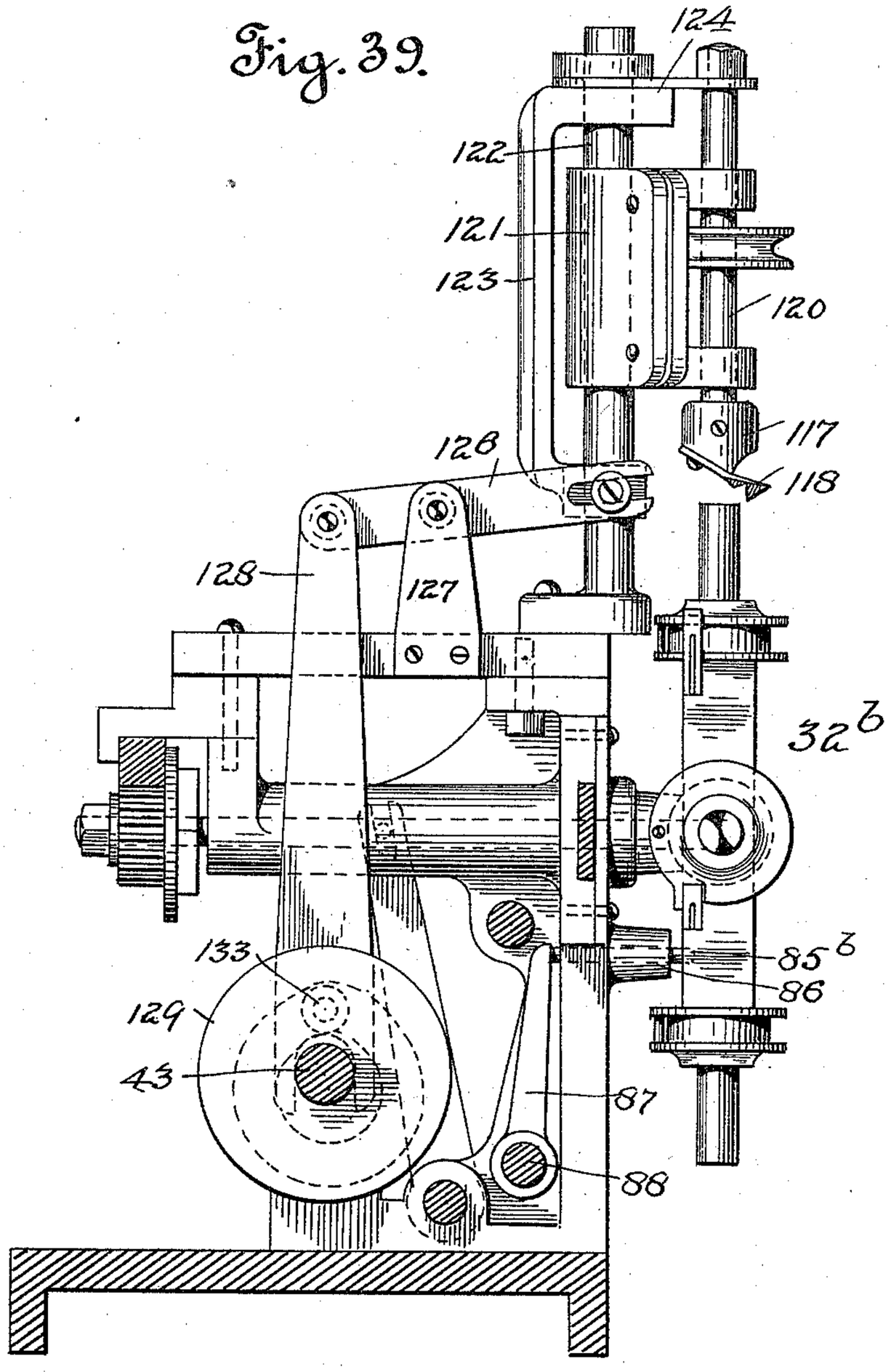
J. K. BIGELOW.

MACHINE FOR FORMING LOOPS.

No. 537,913. Patented Apr. 23, 1895.

Fig. 39.



Witnesses.
F. E. Montenerdy.
M. R. Bryan

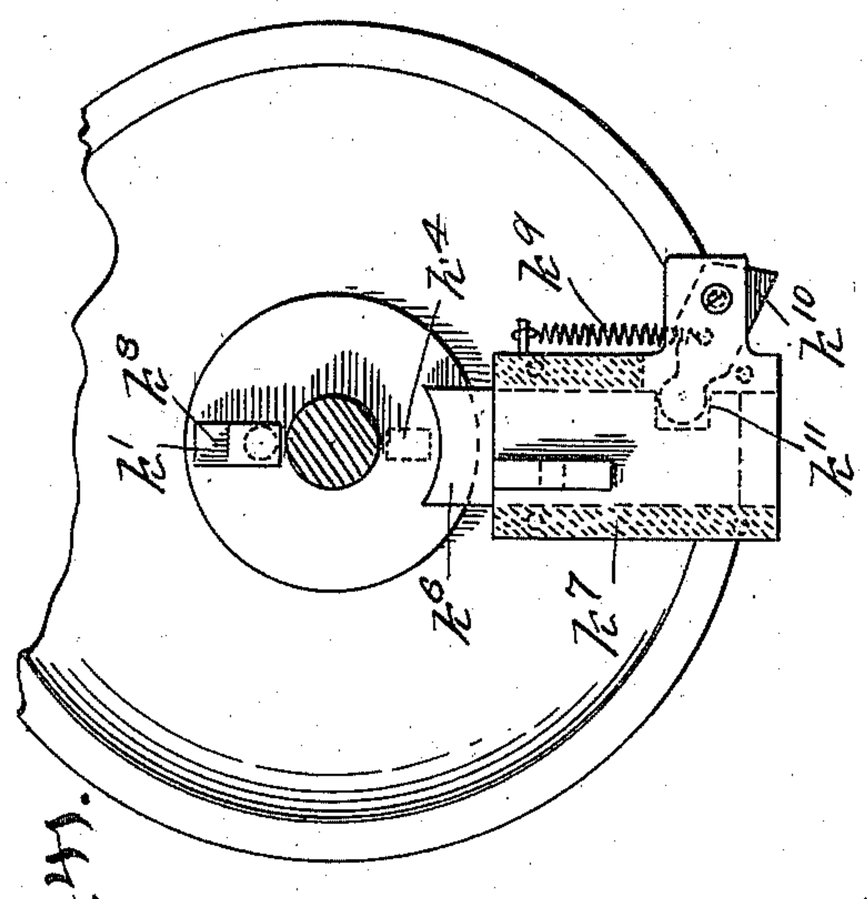
Inventor.
John K. Bigelow
by Spear & Seely
Attorneys

(No Model.) 29 Sheets—Sheet 23.

J. K. BIGELOW.

MACHINE FOR FORMING LOOPS.

No. 537,913. Patented Apr. 23, 1895.



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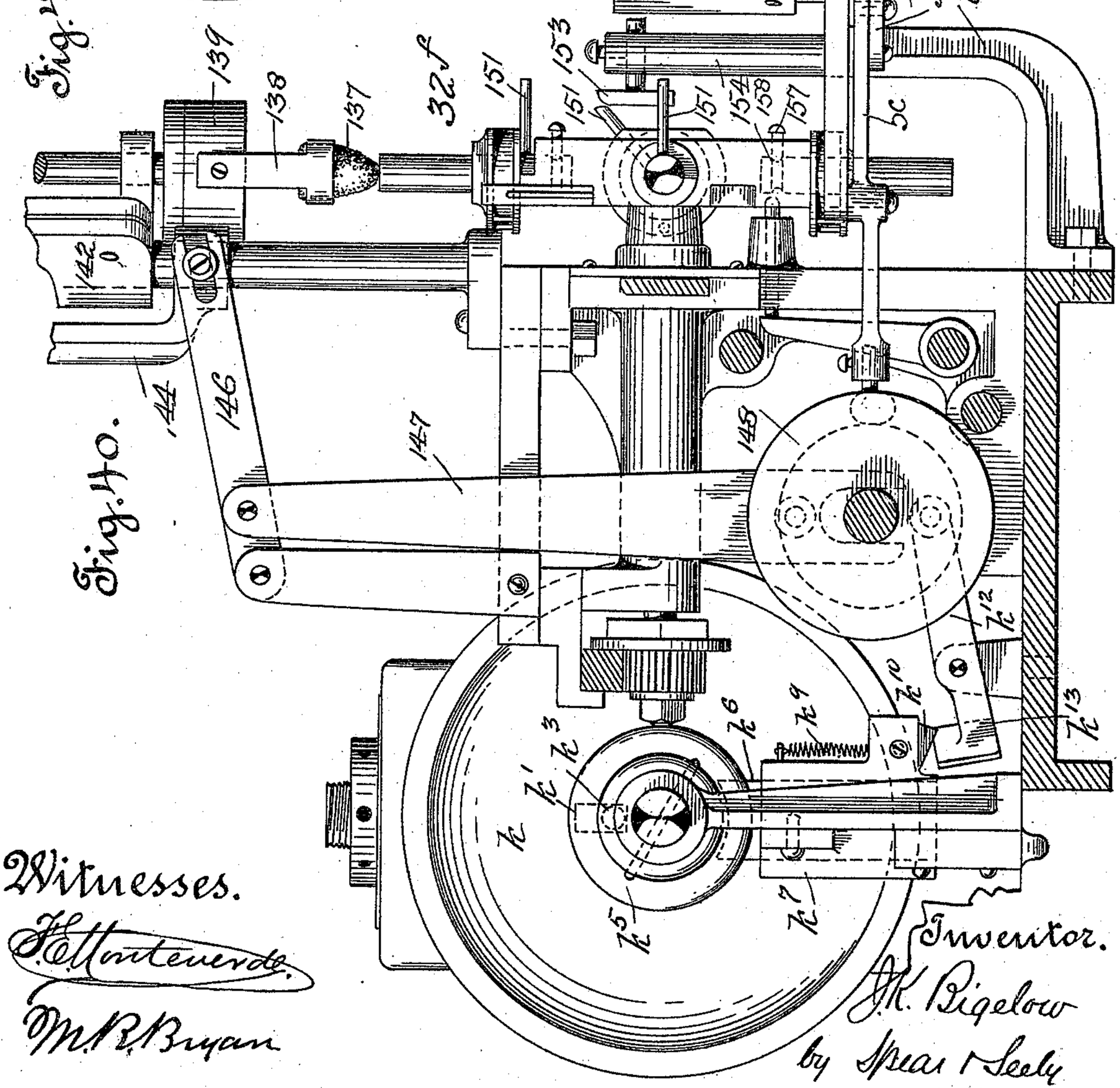

Fig. 40.

Witnesses.
F. Montemerde.
W. R. Bryan

Inventor.
J. K. Bigelow
by Spear & Seely
Attorneys.

(No Model.) 29 Sheets—Sheet 24.

J. K. BIGELOW.

MACHINE FOR FORMING LOOPS.

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Fig. 42.

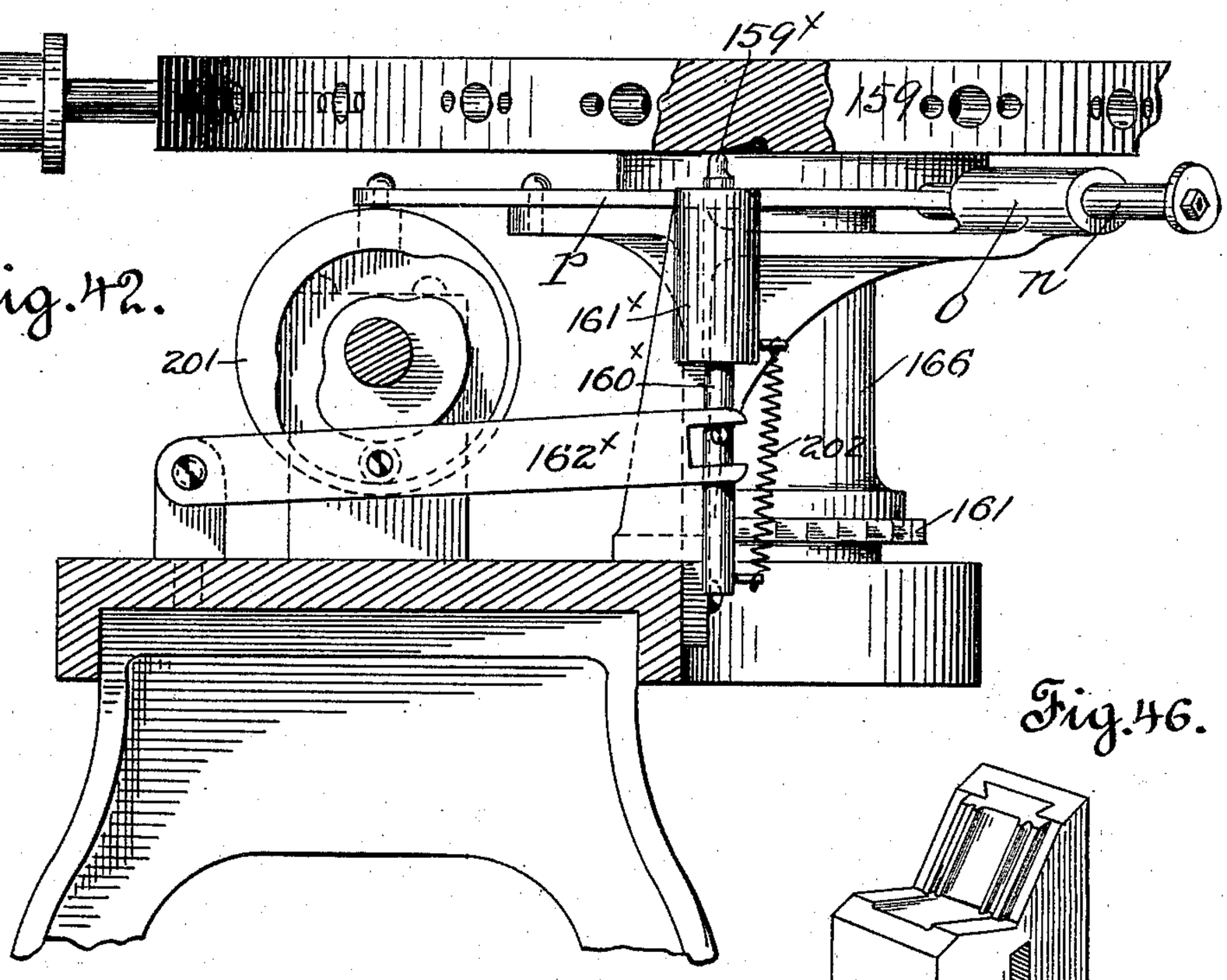


Fig. 46.

Fig. 44.

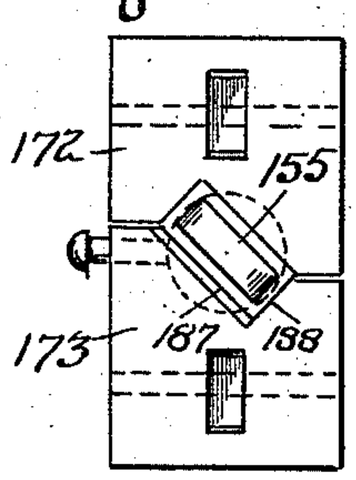
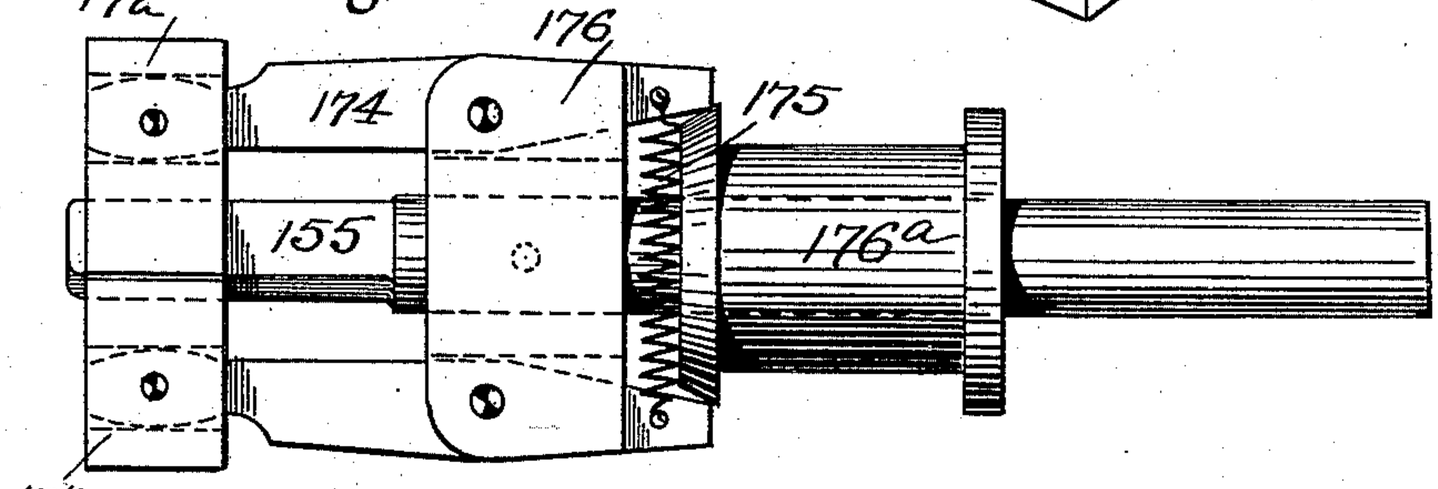


Fig. 43.



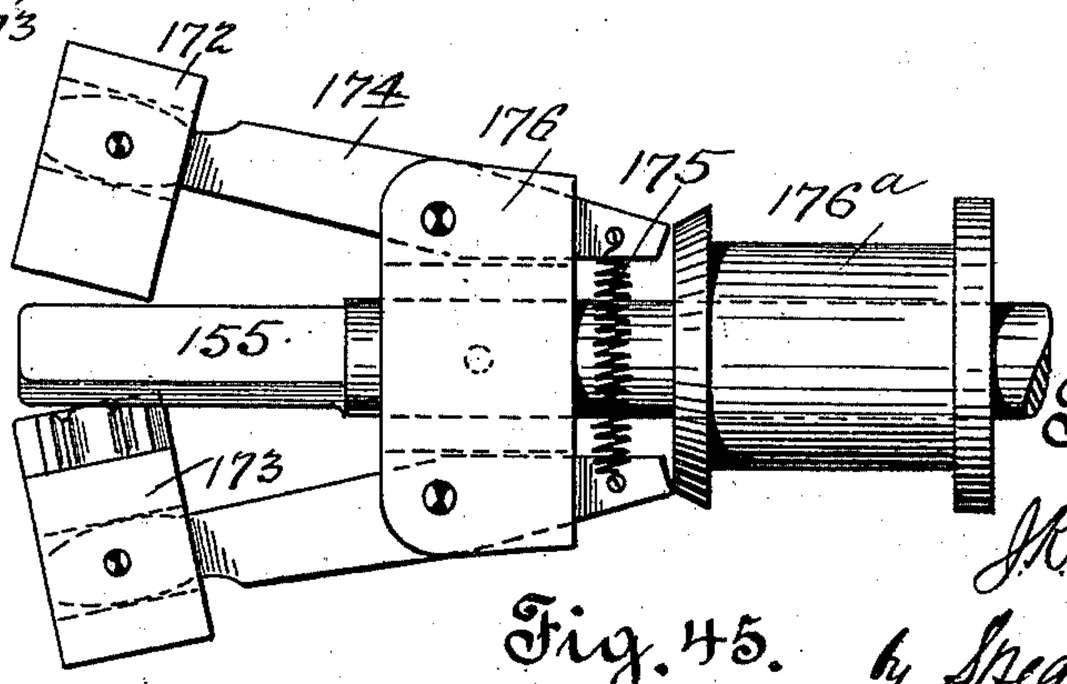


Fig. 45.

Witnesses.

F. Ellmtenerde.

D. R. Bryan

Inventor.

J. K. Bigelow

by Spear & Seley

Attorneys

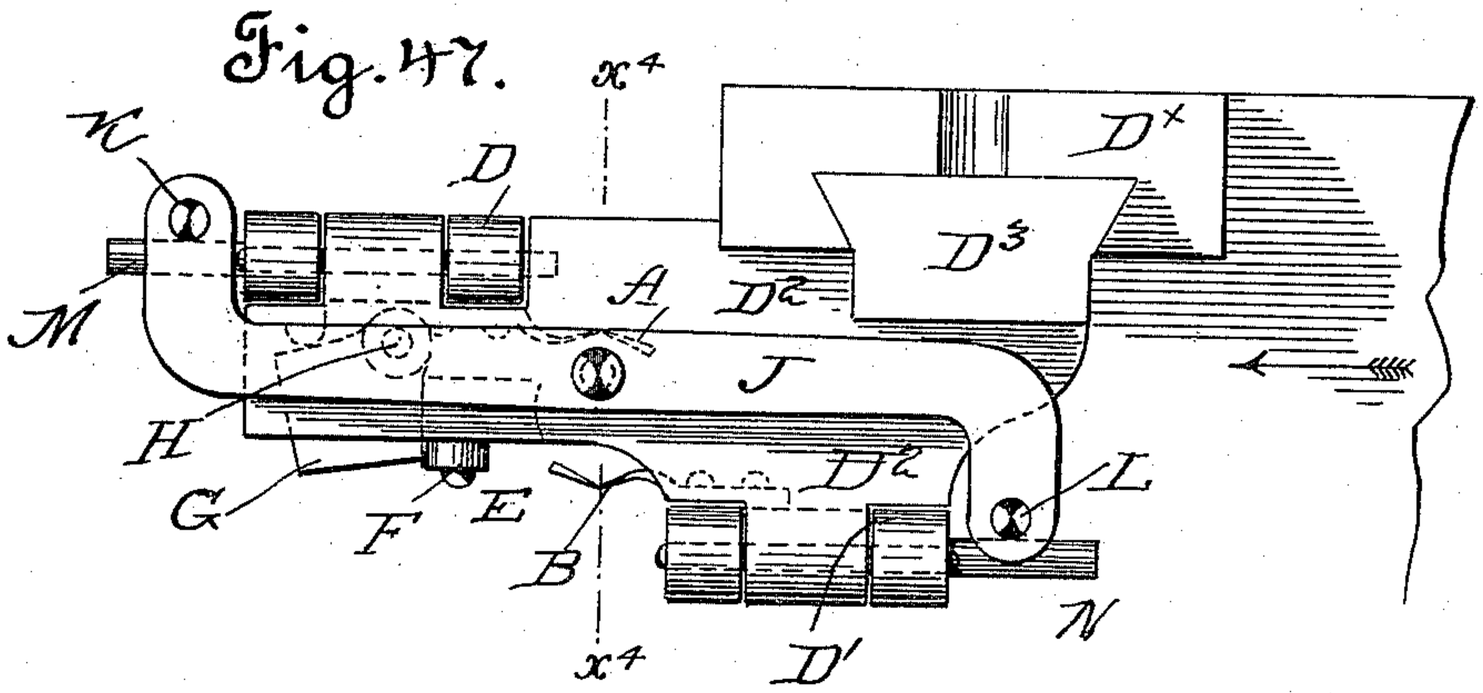
(No Model.) 29 Sheets—Sheet 25.

J. K. BIGELOW.

MACHINE FOR FORMING LOOPS.

No. 537,913. Patented Apr. 23, 1895.

Fig. 47.



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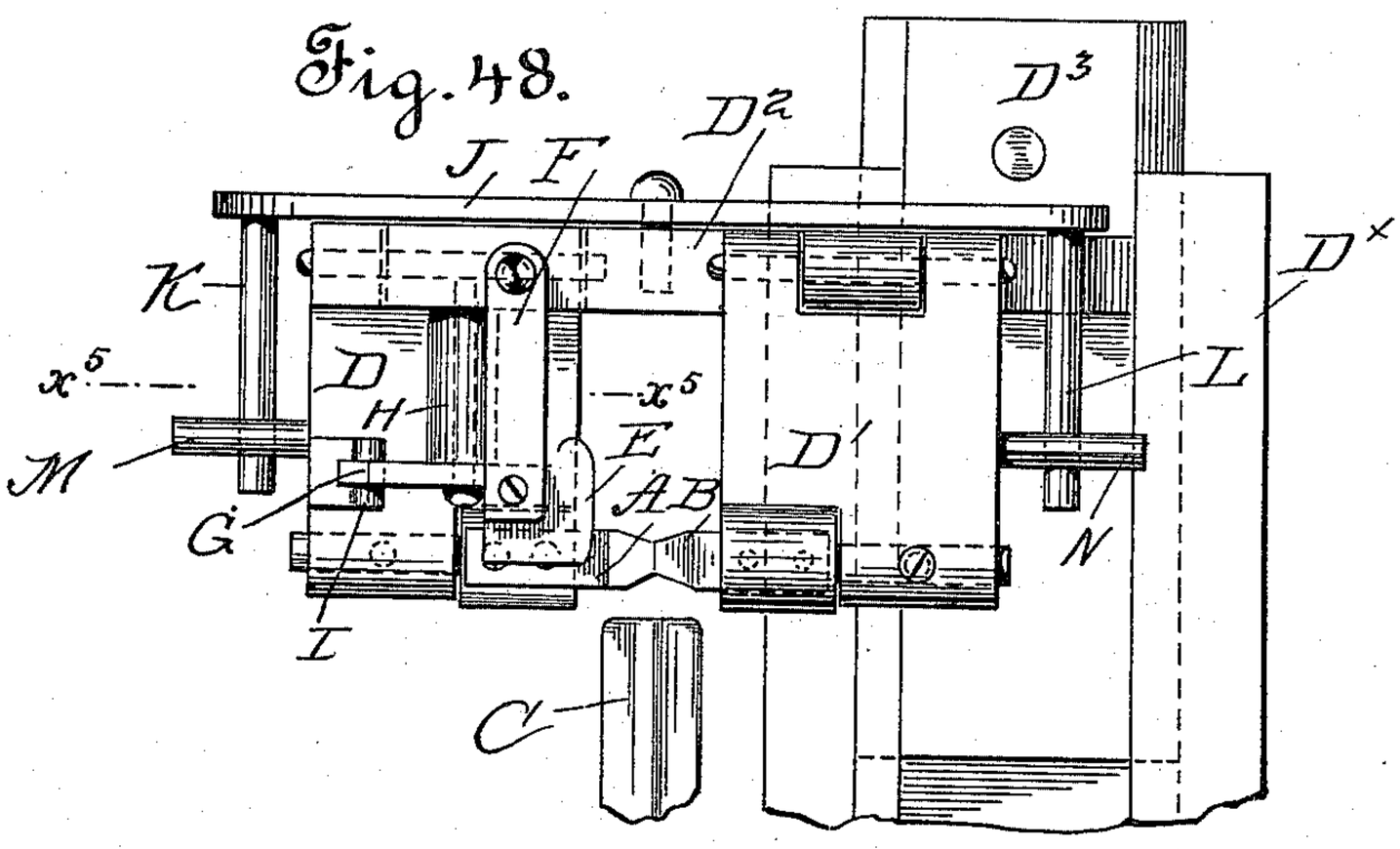

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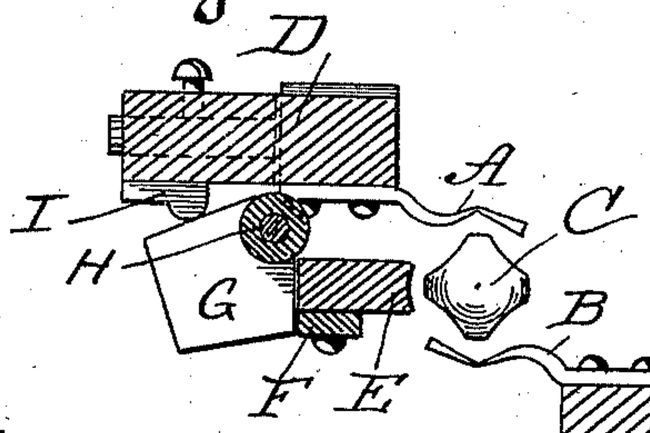

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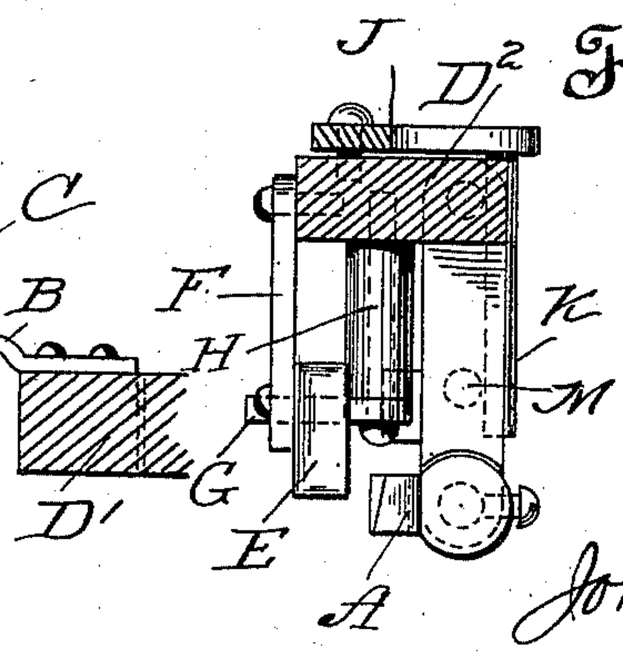

Witnesses.

F. Hollowteverde.

W. R. Bryan

Inventor.

John K. Bigelow

by Spear & Seely

Attorneys

(No Model.) 29 Sheets—Sheet 26.

J. K. BIGELOW.

MACHINE FOR FORMING LOOPS.

No. 537,913. Patented Apr. 23, 1895.

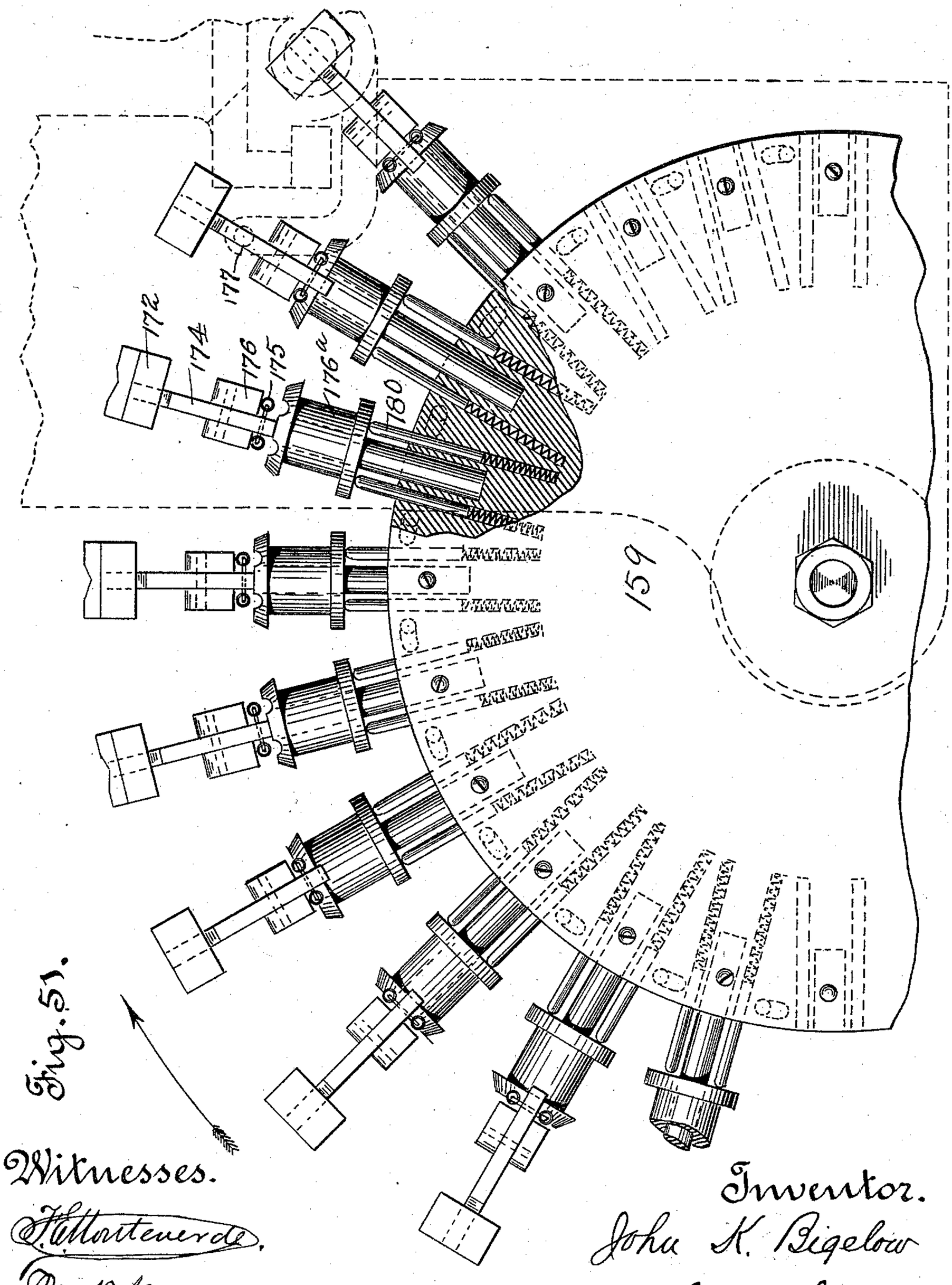

Fig. 51.

Witnesses.
F. Hollowtenerde.
M. R. Bryan

Inventor.
John K. Bigelow
by Spear & Seely
Attorneys.

(No Model.) 29 Sheets—Sheet 27.

J. K. BIGELOW.

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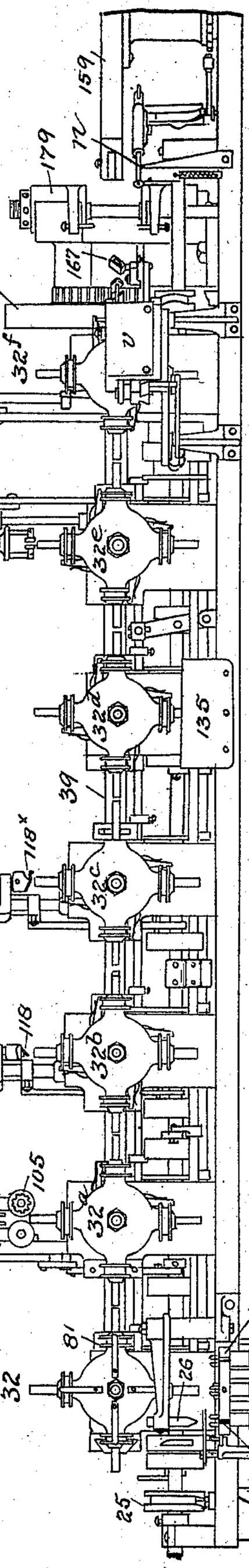

Fig. 52.

Attest
Walter Dewaddson
F. L. Middleton

Inventor
John K. Bigelow
by Spear & Seely
Attorneys

(No Model.)

29 Sheets—Sheet 28.

J. K. BIGELOW.

MACHINE FOR FORMING LOOPS.

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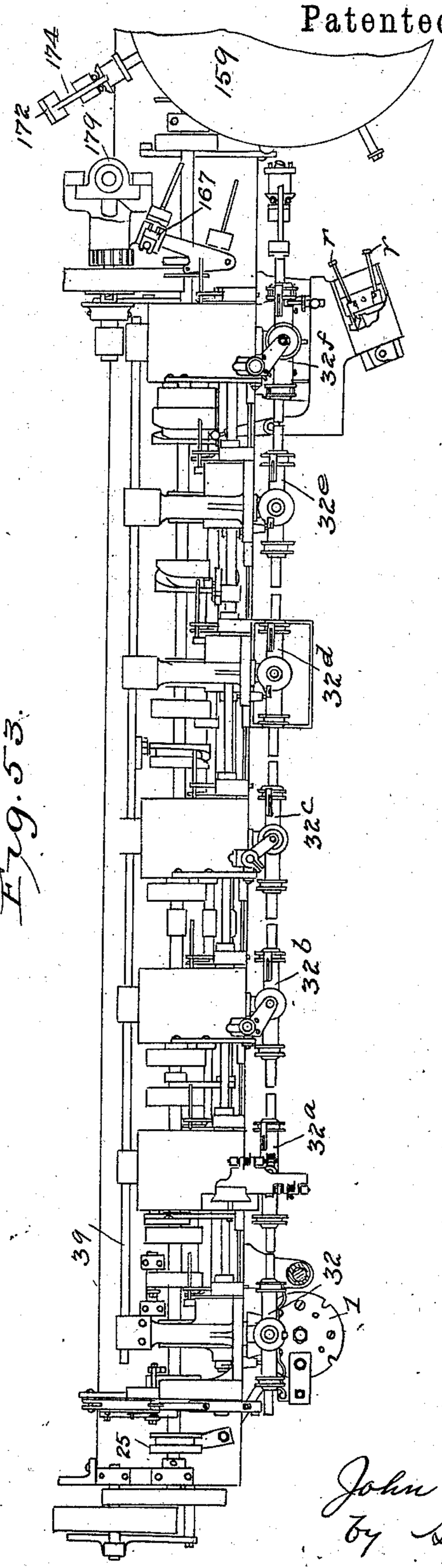

Fig. 53.

Attest
Walter Macleod
F. L. Middleton

Inventor
John K. Bigelow
by Spear & Duffy
Attorneys

(No Model.) 29 Sheets—Sheet 29.

J. K. BIGELOW.

MACHINE FOR FORMING LOOPS.

No. 537,913. Patented Apr. 23, 1895.

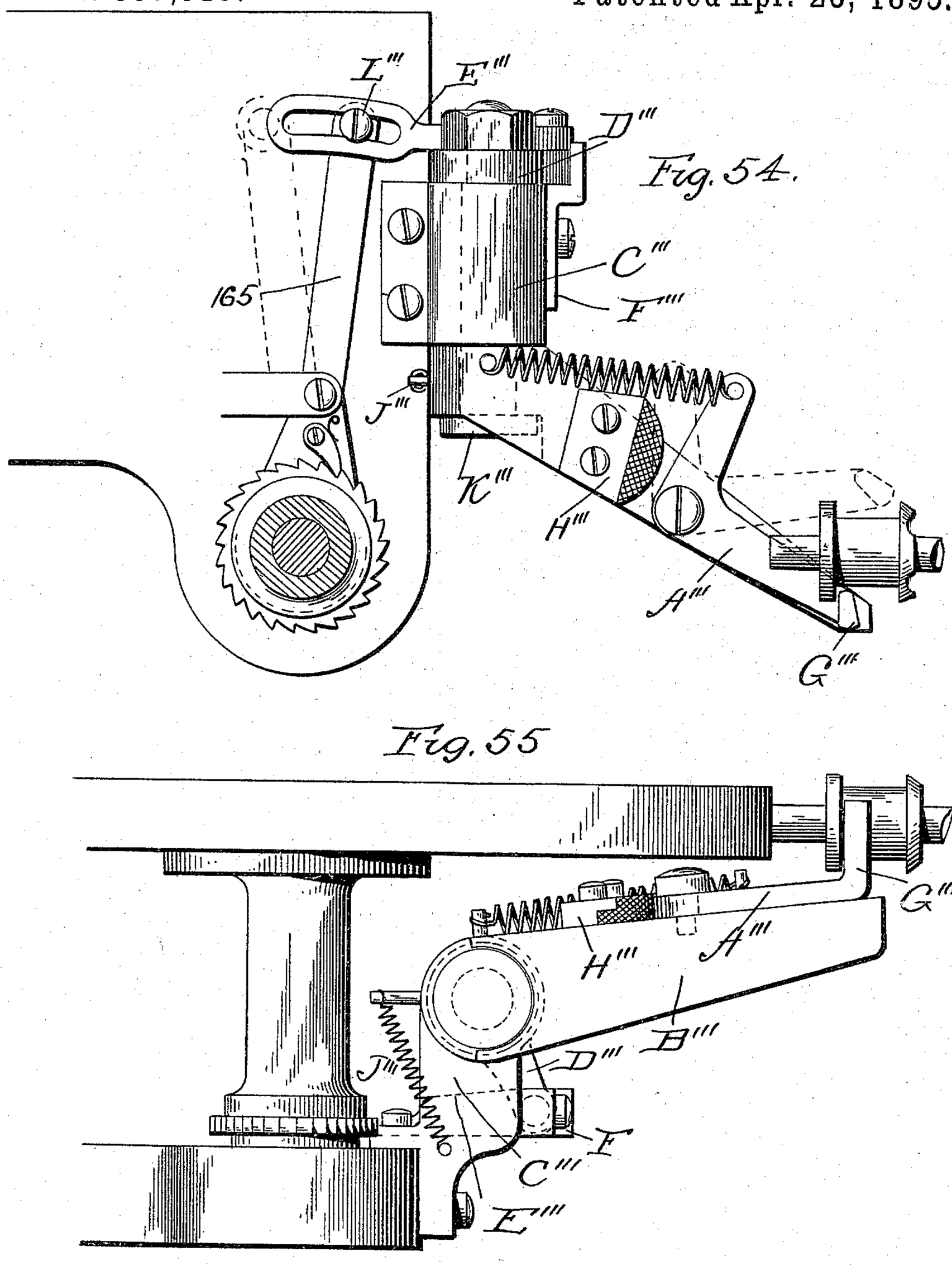

Fig. 54.

Fig. 55

Attest
Walter D. Edmonson
F. L. Middleton

Inventor
John K. Bigelow
by Spear & Selby
Attys

UNITED STATES PATENT OFFICE.

JOHN K. BIGELOW, OF SAN FRANCISCO, CALIFORNIA, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE SEAMLESS LEATHER COMPANY, OF CHICAGO, ILLINOIS.

MACHINE FOR FORMING LOOPS.

SPECIFICATION forming part of Letters Patent No. 537,913, dated April 23, 1895.

Application filed October 4, 1894. Serial No. 524,914. (No model.)

To all whom it may concern:

Be it known that I, JOHN K. BIGELOW, a citizen of the United States of America, residing at San Francisco, in the county of San Francisco and State of California, have invented certain new and useful Improvements in Machines for Forming Loops, of which the following is a specification.

It is the object of my invention to provide a machine capable of forming complete loops for harness and the like from a blank which has been slitted from edge to edge through its width, and the said machine includes means for spreading the slitted blank and placing it upon a carrier arm; means for compressing the ends of the blank; cutters for trimming the ends and the edges; means for blacking the loop and for compressing it into its finished rectangular form and for taking it off the loop stick.

The mechanism comprises a series of rotary heads combined with the pressing, cutting, blacking and compressor mechanisms, with devices for transferring the blanks from one rotary head to the next so that they will be presented in proper order to the several sets of operating devices to be acted upon thereby.

The form of loop the machine is intended to produce is that shown in United States Letters Patent No. 500,111, dated June 27, 1893, said loops being made from blanks which are formed by taking a strap or strip, slitting it at intervals through its width from edge to edge and then dividing the slitted strip into a series of blanks.

In the accompanying drawings:—Figure 1 is a view of the left hand end of the machine at which point the work begins. Fig. 1^a is a view of the split blank. Fig. 1^b is a view of the blank when spread. Figs. 2, 3, 4 and 5 show cams. Fig. 6 is a front view of the next section of machine forming a continuation of that in Fig. 1 which shows a portion of the mechanism of Fig. 6 in proper relation thereto. Figs. 7 and 8 represent cams. Fig. 9 is a front view of the next section of the machine which includes two trimming mechanisms. Figs. 10, 11 and 12 show the trimming knives. Fig. 13 is a front view of the next section of machine to the right of that shown in Fig. 9. Fig. 13^a is a detail view. Fig. 14 is a sectional view through the frame to the left of Fig. 13 showing the left hand rotary head shown therein partly in section. Fig. 15 is a front view of the machine continued, this being the section to the right of Fig. 13 and showing a part of the die carrying table. Fig. 16 is a view of a detail. Figs. 17, 18, 19, 20 and 21 are plan views of different sections of the machine, Fig. 17 showing the left hand end represented by Fig. 1, while Figs. 20 and 21 show the right hand end shown in front view Fig. 16. Fig. 17^a is a detail view. Fig. 22 is a rear view of the left hand end of the machine, shown in Fig. 7; Fig. 23, a rear view of Fig. 6 and one of the cutters of Fig. 9. Fig. 24 is a rear view of the second cutter mechanism with its operating connections. Fig. 25 is a rear view of Fig. 13. Fig. 26 is a detail view showing the presser mechanism. Fig. 27 is a rear view of the inking or blacking mechanism part of which is shown in Fig. 15. Figs. 28 and 29 are details relating to the same. Fig. 30 is a rear view of the compressor mechanism, partly in section, and the die carrying table. Fig. 31 is a detail. Fig. 32 is a side view of the left hand side of the machine. Fig. 33 is a section through the frame on line x—x of Fig. 17 showing the vertically moving table in section. Fig. 34 is a section on line x' x' of Fig. 17 looking to the left. Fig. 35 is a sectional detail on line x^3 x^3 of Fig. 34. Fig. 36 is a detail. Fig. 37 is a sectional view through the machine on line x' x' Fig. 17 looking to the right. Fig. 38 is a sectional view on line z—z looking toward the left of Fig. 18. Fig. 39 is a sectional view on line z—z looking to the right of Fig. 18. Fig. 40 is a view on line w w of Fig. 20 looking to the right. Fig. 41 is a detail view of the clutch controlling the compressor. Fig. 42 is a view on line x^3 x^3 of Fig. 21. Figs. 43, 44, 45 and 46 are details relating to the dies. Figs. 47, 48, 49 and 50 are details of a modified form of trimming knives. Fig. 51 is a plan view of the die table partly in section. Fig. 52 is a front view of the entire machine with parts in section, and Fig. 53 is a plan

view of the entire machine with parts in section. Fig. 54 is a plan view, and Fig. 55 a front view of a hold-back mechanism to reduce jar on the stop pin attached to the die table.

1 is a rotary table, carried by a shaft 2, journaled in the bearing 3, carried by the sliding bracket 4, moving vertically in guides 5, Figs. 1 and 33, said bracket having the rack 6, meshing with the pinion 7, journaled in the depending portion of the guides, Fig. 22, the shaft of which carries a pinion 8, meshinto a segment 9 on a lever 10, pivoted to the frame at 10^x and having its short arm operated by the cam 11 to raise and lower the bracket with the table at the proper moment. The table carries a series of sockets 13 in which forked plunger pins 14 can move vertically being held normally up by springs 15 bearing against their under sides and interposed between the same and the ring 15^x which surrounds the bearing and is connected to the table to rotate therewith by the bars 16. The vertical movement of the forked pins in relation to the table is guided by the pins 17 entering grooves 18 in the sides of the pins. The table is rotated step by step, making a quarter turn each time, by the segment 19 on lever 20 meshing with the pinion 21 on the lower end of the table shaft, the said pinion being long enough to maintain the connection while the table moves up and down. This pinion carries a flange and pawl 21^x engaging a four tooth ratchet 22^x on the table shaft and by this mechanism the table is moved a quarter turn at each step. The table is notched around its edges to receive a detent finger 25^x on a pivoted piece 26^x the other finger 27^x of the piece being operated by a lever 28^x, Figs. 1, 17 and 17^a, carrying a roller 29^x to be operated by the rib 30^x on the cam 48 on the cam shaft 43. Through this mechanism the detent releases the table at the proper time for the rotary motion. The detent is normally pressed by the spring 49 to engage the table. The table is counterbalanced by a weighted lever 71 Figs. 32 and 34 pivoted to the frame and connected by a link 72 with the bracket carrying the table. The lever 20 is operated by the rock shaft 22 journaled in the hanger 23 from the machine bed and the lever 24 at the upper end operated by the grooved cam 25, Figs. 1, 17 and 33.

The table has four of the forked pins, and each time the table is moved a step one of the pins holding a slitted blank is moved from the position at the front of the table where the blank is placed in the forks as shown in Fig. 1, to the position at the left directly under the V shaped pin 26, held firmly by the bracket 27 on the machine frame, and adjustable thereon by the screw 28. While in this position the table is raised by the connections described, and the point of the V shaped pin enters the slit in the blank, and in the further movement of the table the blank is thrust upon the pin and is spread. During this action the forked pin 14 is caused to recede into the table by its lower flange coming into contact with the bracket Y, the yielding spring allowing this action which is gradual. The blank is now held by the cylindrical part of the V shaped pin and as the table now falls the spread blank is stripped from the V shaped pin by a stripper 28^c and is thrust over the forks of the pin 14 to encircle the same, the said pin being forcibly protruded from the table by its spring and pin W coming in contact with the bracket Y as the table falls and leaves the V shaped pin. This stripper is carried by an arm 27^c, Fig. 1, connected with the table carrying bracket, and it has an opening 30, Figs. 1 and 17, to fit over the cylindrical part of the conical pin. At the next rotary movement of the table the blank held on the outside of the pin 14 is brought beneath the radial arm 31 of the rotary head 32 carried by a shaft 33, journaled in the machine frame. At the next rise of the table this arm 31 which is cylindrical, is thrust into the open blank, the spring pressed pin receding for this action and the blank is thus transferred from the forked pin to the radial arm of the head. The shaft of the head turns in bearing 34, Fig. 17, and at its rear carries a four tooth ratchet such as is shown at 35, Fig. 14, operated by a pawl 36, dotted lines Figs. 22, 34, and 35, on a disk 37 moving with a pinion 38 loose on the shaft and operated by a rack bar 39 extending lengthwise of the machine and having rack teeth at intervals. The rack bar is reciprocated by a lever 40, Figs. 19 and 24, pivoted at 41, and operated by a cam 42 on the main cam shaft 43, which extends longitudinally of the machine and carries the cams 11 and 25 before mentioned. This shaft is driven through the gearing 44 and 45 and belt wheel 46, Figs. 17 and 32. The head, like the table, makes a quarter turn at each movement and the first step brings the arm with the blank to the presser mechanism arranged at the left of the head as shown in Fig. 1. The blank is now in the form shown in Fig. 1^b, having been spread from the form shown in Fig. 1^a. The pressers, consisting of the blocks 50, Figs. 17, 26, 32 and 33, are dovetailed into the ends of the levers 51, pivoted at 52 to a sliding block 52^x moving in guides in the standard head, and having their rear arms connected by toggle links 53 to a sliding piece 54 operated by a fork 55 carried by the upper end of the lever 56 which is operated by a link 57 having a forked end embracing the cam shaft 43 and operated by its roller 58, Figs. 2 and 33, entering a cam groove in the cam 59. This mechanism effects the opening and shutting of the pressers and when the pressers close the square ends of the blank 60, Fig. 1^b, are pressed down and the blank assumes a more ring like form. The sliding block is reciprocated toward and from the rotary head at the front of the machine so that the presser may be retracted to allow the rotary head to turn one step, and then

moved forward again for the pressing action. This reciprocation is effected by a lever 61, Figs. 17, 22 and 33, pivoted to the machine bed at 62 and having a roller working in the groove of the cam 48 before mentioned. The fork 55 forms a detachable connection between the lever 56 and the slide 54 which operates the presser levers, and the main slide may continue the retracting movement after the presser arms are fully opened. As shown in Fig. 33 the lever 56 and fork 55 remain in the position there shown until the main slide 52^x is again moved forward when the fork 55 lifted to engage the pin 64 and then the lever 56 swings forward moving the slide 54 and toggle arms 53 and closing the presser levers to press the next blank. The fork 55 is moved vertically in the upper end of the lever 56 by a lever 65 pivoted to a stud 66 attached to the link 57 and swinging therewith, the said lever having a pin 67 passing through a slot in the lever 56 and into the shank of the fork 55. The other end of the lever carries a roller 68 to be struck by the cam projection 69 on the cam 59, Figs. 1 and 33, and when so struck the fork is depressed from engagement with the pin 64 and the main slide with the presser arms continuing its backward movement, the fork is held down by riding against the overhanging part 70 of the link 54, Figs. 26 and 33, until the main slide 52^x is moved again forward carrying the overhanging part past the fork when the same is raised to engage the pin 64 by the spring 74, Figs. 1, 17 and 33, constantly tending to throw the fork up. The presser now being in position to close the lever 56, is swung forward operating the link 54 and toggle 53 and forcing the presser block hard upon the square ends of the blank to press them down. The pin 64 of the link 54 moves in a slot 75, Fig. 26, in the tail piece 76 of the main slide, thus allowing the link 54 to have sliding movement independent of the main slide. A spring 77 tends to draw the rear ends of the presser levers together and to thus open the pressers and hold the said rear ends against the stop pins 78, Figs. 26 and 33. The presser levers comprise the main parts and the supplemental arms 79 pivoted to the rear ends of the main parts and having their front ends entering recesses 80 in said main parts and adjusted by the set screws 80^a. The toggle links are connected with the rear ends of the supplemental arms and by this arrangement the wear of the presser blocks may be taken up and the amount of pressure transmitted thereto accurately adjusted. The arms are held in position by the springs 81.

It will be understood that at each movement of the rotary table 1, one slitted blank is spread and that which has just been spread is transferred to the radial arm of the rotary head 32, and at the same time the previously transferred blank is pressed by the pressing machine just described. The rotary head is now turned step by step and carries the pressed blank from the left, Fig. 1, to a point directly opposite and in direct line with the radial arm on the left of a second rotary head 32^a. These rotary heads and those to be described hereinafter are held accurately in position after each movement by the gage stop pins 85, 85^a, 85^b, &c., which move through bosses 86, in the frame, and are operated by the levers 87 on a rock shaft 88 extending lengthwise of the machine, said rock shaft being operated by a link 89 having a forked end embracing the cam shaft 43, a roller engaging a cam groove in the cam 91, and an arm 90 connecting the link with the rock shaft 88. There is one of these gage pins for each head, all operated from the cam 91, the rock shaft 88 and arm 87.

The blank is transferred from the radial arm of head 32 to that of head 32^a by the sliding collar 81 with which each arm of all the rotary heads is provided. On the head 32 these collars are maintained in position against rotation by the springs 82 engaging notches in the flanges of the collars. The collars are slid on the arms to make the transfer by plates 83 which are pushed forward through their guide blocks 92 to engage the grooves 97 of the collars by levers 93 fixed on the rock shaft 94 extending lengthwise of the machine and operated by an arm 95 having a roller engaging a groove in the cam 96 on the shaft 43 Figs. 13, 14 and 24. The forward end of the rod is curved to conform to the periphery of the sliding collar and it has a beveled end 98, Fig. 38, to lift the latches 99 which hold the sliding collars normally both against rotary and sliding movement as shown in Figs. 6, 9, 13 and 20. The curved end of the plate has a notch 100 to fit the pin 101 extending across the groove in the collar so that after the collar is released from its latch it will still be held against rotary movement by the pin in the notch of the transfer plate. After the plate has engaged the collar the block 92 with the plate is moved longitudinally of the machine by a reciprocating rod 102 having collars 103 embracing the block. In order to maintain the connection between the transfer plate and its operating lever a long pin 130 is provided extending loosely through the plate and carried by a small cylinder 131 sliding in the main frame. This pin 130 passes also through the upper forked end of the lever 93 and is thus moved back and forth, and when the transfer plate moves laterally it merely slides along this pin 130. The rod 102 is reciprocated by the lever 104, Figs. 13, 19 and 25, pivoted to the machine frame and having a roller engaging a groove in the cam 105, the upper end of the lever being forked and engaging a pin 106 projecting from the block 107 on the rod. The transfer is effected when the heads have been turned so that the opposing radial arms align accurately.

It will be understood that a transfer plate is provided at each station between the rotary heads and as they are similar the above

description will suffice for all of them, it being understood that all plates are operated to transfer by the longitudinal movement of the rod 102. The blank having been transferred to the left hand radial arm of the head 32^a the said head makes a step in the direction of the arrow, Fig. 6, carrying the blank upward into position under the trimmer mechanism intended to trim the edges which have been pressed as described. This rotary movement of the head is effected by pawl and ratchet mechanism similar to 35, 36 and 37 before described from the same rack 39 which has a series of teeth 39^a, Fig. 23.

The trimmer knives comprise two concave cylindrical cutters 105, Figs. 6, 18. 23 and 37, adapted to trim and round the blank at the pressed ends. These cutters are carried by pivoted arms 106 depending from the cross head 107 and under tension of springs 108 pressing the cutters constantly toward each other and to the work, the position of the cutters being determined by the gage blocks 120^x engaging the blanks and by stop screws 109 engaging the pins 110. The cross head is moved down its guides 111 to bring the cutters into action and raised again by the link 112, the lever 113 and arm 114 operated by the grooved cam 115 on the cam shaft. The cutters are rotated by the belts 115^x, Fig. 6, passing around the pulleys 116. After the cutters perform their work and return to normal position, the rotary head advances another step and brings the blank opposite the left hand radial arm of the next rotary head 32^b. The spring latch, holding the transfer collar, is now lifted by the transfer plate at this station and the transfer of the blank to the head 32^b is now effected by the lateral movement of the transfer plate 83^a in a manner similar to that described. This head now advances one step carrying the blank up into position below the top edge trimmer having a knife 118 carried by the head 117^a and adapted to trim the upper edges of the blank. This knife head is fixed to a shaft 120 journaled in a bracket 121 the two parts of which are clamped to the post 122. Vertical movement is imparted to the shaft to move the cutters to and from their work by the yoke 123, Figs. 9, 23, 24 and 39, sliding on the post and having its upper end connected to the upper end of the sliding shaft by the arm 124 and nut. The yoke is moved vertically by the lever 126 pivoted to the standards 127 and the link 128, the lower end of which is forked to embrace the cam shaft 43, a cam 129 having a groove operating the said link 128 through its roller 133. After this trimming operation, the head 32^b advances another step, carrying the blank to the left hand radial arm of the head 32^c to which it is now transferred through transfer mechanism similar to that described. This head then advances and reverses the blank and presents the lower edges thereof to a second trimming mechanism comprising the cutter 118^x and operating mechanism similar to that just described. The trimmers are rotated by the pulleys 134 and 134^x on the shafts which receive suitable belts. From this head the blank is transferred to the rotary head 32^d. This is revolved in the opposite direction from those previously mentioned and carries the trimmed and pressed blank down through the bath of ink or blacking 135, Fig. 13, and then up opposite the left side of the next rotary head 32^e. In order to give this reverse movement to the head 32^d its operating rack teeth 39^d, Fig. 25, engage the lower edge of the pinion, said rack teeth being carried from the rack bar 39 through the arms 136. The pawl and ratchet mechanism is reversed in an obvious manner from that described and the reverse movement of the head is thus effected. The blank is then transferred to the next head 32^e, which head advancing carries the loop under the ink distributing mechanism which consists of two distributing pads A^x of leather pierced to form pockets forced onto the spring B^x, said spring being carried on pins C^x fitting in circular holes in the circular plates d^x, thereby allowing of the adjustment of the distributing pads to conform to the various sized loop blanks, circular plate d^x being carried by the shaft E^x. Reciprocating motion is produced by mechanism similar to that before described. This ink distributing mechanism serves to properly distribute the ink over the blank, giving the same effect as by rubbing with a cloth or in the hands and serving also to dry the ink and prepare it for the second dip or application in the harness dressing.

From the head 33^e the blank is transferred to the last head 32^f of the series and here it is carried up in the direction of the arrow into position under the device for applying dressing which consists of a sponge 137, Figs. 27, 28 and 29, carried by the bracket 138 from the reservoir 139 and to one side of the center thereof. The reservoir is carried by the shaft 140 concentrically, being screwed to the end of the shaft and covered by a screw cap 141. The shaft is journaled in the bracket 142 clamped to the post 143 and is reciprocated vertically to carry the dressing sponge to perform its work by the yoke 144 sliding vertically on the post, connected with the shaft by an arm 145 and operated by the links 146, 147 and the cam 148 on the cam shaft 43. The rotation of the shaft with the reservoir will carry the sponge around the blank on the radial arm and thus supply dressing to the same. The supply of dressing to the sponge is regulated by the valve 150.

I may if desired place a second dressing tank below the rotary head 32^e and by reversing the motion from that shown in Fig. 13 I can pass the blank through this second tank.

All the radial arms thus far described have been fixed in their heads. Those of the last head 32^f however are adapted to have limited rotary movement and for this purpose each

arm has a pin 151 projecting laterally therefrom through a cutaway part 152 in the head, and when the arm is being carried by the head to the position at the right thereof, as in Fig. 20 this pin strikes the cam piece 153 supported adjustably on the post 154 on the frame thus turning the arm about one-eighth of a revolution and thus turning the blank into an inclined position so that it will align with and may be transferred to the loop stick 155 Figs. 30, 43, 44 and 45 which is of rectangular cross section and of the size and shape of the interior of the completed loop. This inclined position of the loop brings the corner edges which have been trimmed, out of the same vertical plane and throws them around into an angular plane so that in the subsequent compressing action these trimmed and pressed parts will not form the corners of the complete loop but will be at the sides thereof. The rotary arms are returned to normal position by the spring 1, Fig. 16, connected therewith in the recessed end, said spring encircling a pin *m* projecting from the main body of the head and having its other end engaging the said head. The transfer to the loop stick is effected by a set of transfer devices 83^f, 93^f similar to those before described. The radial arms are held in the head by the screws 157 entering the grooves 158 in the inner ends of said arms. The loop sticks project radially from a carrier table 159, rotated step by step by a pawl and ratchet 160, 161, Figs. 15, 21 and 30, operated from the cam 162 on the shaft 43 through the lever 163, the link 164 and the pawl lever 165. The ratchet is fixed to the sleeve 166 of the carrier. The loop sticks as before stated are set at an angle in the carrier with the line of their width inclined to the horizontal plane, and after having received the loop blank, and the table having made two steps, the loop stick carries the blank from the last rotary head 32^f, Fig. 20, to a position opposite the sleeve 167, which is inclined to conform with the loop stick and is adapted in shape to fit accurately thereon. This sleeve is carried by a slide 168 moving in guides 169 and reciprocated by a lever 170 connected with the slide, pivoted to the machine bed and operated by a grooved cam 171 on the cam shaft. This sleeve pushes the blank farther on to the loop stick into the precise position desired for the subsequent operations and thus gages the position of the loop thereon. Each loop stick is combined with dies for pressing the blank into final rectangular form. The dies comprise the upper and lower sections 172, 173 carried by levers 174 pivoted to heads 176 secured to the shanks of the loop sticks. The dies are held normally open by the springs 175 between the rear ends of the die levers and they are locked in closed position by the sleeves 176^a sliding on the cylindrical rear part of the loop sticks, said sleeves having beveled flanges at their front ends to be forced in between the rear ends of the die levers. When the blank has been placed in proper position on the loop stick and the rectangular sleeve retracted, the dies are forced together by the screw studs 177 carried by arms 178 extending from the upper and lower compression heads 179, and the locking sleeve 176^a is immediately forced forward by the spring pins 180, Fig. 51, arranged in the table and pressing against the rear of the sleeve. The levers and dies are now held locked while the table makes another step and carries the die with the blank under the compression head ready to be pressed thereby. These compression heads comprise as shown in Figs. 21 and 30 the cylindrical part having lateral guide flanges 181 engaging guides 182 in standard 183 of the machine frame, the central compression rod 184 having a collar 185 screwed on its lower end and fitted to the interior bore of the cylindrical head, the collar 186 screwed on the upper end of the said rod and adapted to limit the downward movement thereof and the helical spring coiled around the central rod and bearing against the lower collar so that the central rod will be forced down but will act upon the dies with a yielding pressure. The dies, Figs. 30, 40 and 46 are formed with oblique die faces 187 and 188 at right angles to each other, the long faces 187 pressing the blank to form the top and bottom while the other shorter faces 187 form the sides of the completed loop. The incline of the die opening, Fig. 44, corresponds to that of the inclined loop stick, the opening being larger than the loop stick to an extent equal to the thickness of the loop. By forming these die faces oblique to the horizontal plane a compression is simultaneously effected on both the sides and end of the blank and at one operation of the dies as shown in Figs. 30 and 44. One side of the die is longer than the other, to get the extra length in the die faces intended for the top and bottom of the loop but as these dies form the subject of a pending application filed August 1, 1894, they need no further description herein. They are shown in Fig. 30 as held closed by the locking sleeve 176^a and between the presser heads ready to be forced together thereby to compress the blank into the completed form of the loop. The compression heads are moved vertically by sliding blocks *a* on the pins *b* placed eccentrically in the end of the upper and lower shafts *c*, *d*, the said blocks moving in recesses extending transversely of the compressor heads, dotted lines Fig. 21 and detail Fig. 31. These shafts are operated through gears *f*, *g*, thereon from an intermediate gear *h* on the driving shaft *i* journaled in the standard of the machine and carrying a belt wheel *k* through which the shaft is driven. The belt wheel is combined with a clutch for throwing it into and out of action which consists of the block *k'* adapted to a recess in the face of the drum but pressed normally therefrom by a spring pin k^2 and guided by a pin k^3. This block

when out is in the path of the lug k^4 on the collar k^5 fixed on the belt wheel shaft so that when the spring pressed block and lug contact with each other the presser head will be operated. A slide k^6 moving in a fixed guide k^7 normally stands with its upper end in the path of the beveled end k^8 of the spring pressed block so that when the same reaches the slide in the revolution of the belt wheel said beveled end will contact with the slide and thus the spring pressed block will be pushed back into its recess while passing the slide and it will thus miss the stud k^4 of the fixed collar k^5 which lies normally directly above the curved end of the slide. When however a compression is to be effected the slide is lowered thus allowing the spring pressed block to strike the lug and turn the belt shaft and gearing and operate the compressors. The slide immediately rises and thus throws the spring pressed block out of action at the end of the revolution. The slide is held normally up by a spring k^9 fixed to the guide k^7 and to the lever k^{10} the end of which enters a notch k^{11}, Fig. 41, in the side of the slide. The slide is lowered by the lever k^{12} having an inclined head k^{13} engaging the lever k^{10} said lever k^{12} being operated by cam 148 on the main cam shaft 43. After the compression and the complete formation of the loop the table moves step by step carrying the loop around with it in the direction of the arrow, Figs. 21 and 51, the dies being held locked by the locking sleeve until the same reaches the station directly over the sliding rod n, Figs. 15, 21 and and 42 which has a head or disk to engage the rear flange of the sleeve when the sleeve reaches this position. Having engaged the sleeve the rod is moved radially inward in its guide bracket O by the lever p pivoted to the said bracket and operated by an abutment on the side of the cam 162 before mentioned. The sleeve is thus retracted to the position shown in Fig. 45 thus allowing the spring 175 to open the die levers, spread apart the dies and leave the completed loops exposed on the loop stick ready to be discharged. The table now takes another step in advance thus bringing the parts to the position x, Figs. 20 and 21, opposite the discharge grippers which comprise the heads r, Figs. 15 and 20, inclined to correspond with the incline of the completed loop and the arms S carrying the said heads. The arms project from the levers t pivoted to the slide u moving in the box v secured to the machine frame by the bracket w, Figs. 20 and 40, and operated from the cam 200 on the shaft 43 by the lever x, the link y and the forked lever z engaging a pin u' projecting from the lower face of said block u. The levers t are held apart by the latch t' pivoted to one lever and engaging a catch t^2 on the other lever, said latch being held normally in engagement with the catch by the spring t^3. When the gripper heads r have gotten in position in the rear of the loop the latch is released from the catch by coming in contact with the lug t^8 on the end of the box v and the levers are drawn together by the spring t^4 this movement causing the end of the latch to be drawn clear of the lug t^8 allowing it to engage the outer side of the catch thereby locking the levers t together and causing the heads to close on the loop stick. The slide u with the levers and grippers is then retracted drawing the loop off of the loop stick allowing it to drop into any suitable receptacle. The further movement of the slide u brings the other end of the latch in contact with the lug t^9 thereby releasing it from the catch, and allowing the levers with the gripper heads to be opened by the inclines t^5 on the levers working against the pins v' fixed rigidly in the box v which opening movement withdraws the latch from engagement with the lug t^9 allowing it to engage the catch holding the levers apart ready for the next forward movement. The table 159 is stopped accurately in position by the pin 159^x on the rod 160^x moved in guides 161^x by the lever 162^x operated by the cam 201, Figs. 21 and 42, the rod being pressed upwardly by the spring 202.

Instead of using rotary knives for trimming the edges of the blank I may as in Figs. 47 to 50 use reciprocating cutters and interpose mechanism between them whereby the position of one knife relative to the blank and holder therefor will be determined by the position of the other cutter relative to said parts in order to produce a loop of uniform thickness. These cutters A, B, have double cutting edges so that any roughness or fringe like formation left by the downward thrust of the cutter will be trimmed off clean by the upper cutting edge on the rise of the cutting blade. The arm C for holding the blank is of substantially rectangular form and the knives which are angular conform to the arms and are adapted to trim the ends of the blank. Each knife blade is carried by a plate D, D', hinged at its upper end to the cross head D^2 which has a slide D^3 moving vertically in the guide D^x. A bearing shoe E carried by a link F pivoted to the cross head D^2 bears upon the blank at one side and this shoe bears upon a piece G pivoted horizontally to the boss H, depending from the lower side of the cross head and bearing against a rounded block I on the pivoted plate D carrying the knife A, so that if the blank is thicker than usual at the point where the bearing shoe presses upon it, the knife A will be forced back slightly to trim less of the blank away and if the blank is thinner at the bearing shoe the knife A will trim more away at its point of contact thus securing uniformity of thickness at these two points. A lever J pivoted to the top of the cross head has depending pins K, L, engaging pins M, N, on the hinged plates so that when the plate D is moved back by the bearing shoe and pivoted piece, the other plate D' will receive a like movement in the opposite direction by the le-

ver J and pins mentioned, thus moving the knife B equally with the knife A and securing a uniform cut at both knives.

Figs. 54 and 55 show hold back mechanism to reduce the jar on the stop pin of the table. This consists of a lever A''' pivoted to the swinging arm B''' so as to move horizontally, and having a lug G''' projecting from the upper side of its longer arm adapted to engage the sleeve 176ª and having a spring attached to its shorter arm holding the lug normally pressed against the sleeve. The arm B''' is fastened on the stud K''' journaled in the bracket C''' the lever D''' being fastened on the stud on the opposite side of said bracket and adapted to be moved by the link E''', said movement being limited by coming in contact with the bracket stop F''', the link E''' having a slot near one end allowing the screw L''' to move and engage the link when nearing the end of its stroke. The arm B''' is held normally down by the screw L''' in the end of the pawl lever 165 engaging the end of the slot in the link E, as shown by the dotted lines, the lever A''' being held against the rubber fastened to the lug H''' as shown by dotted line. When the pawl lever is moved in the direction of the arrow the arm B''' carrying the lever A''' is raised by the spring J''' and the die table being rotated at the same time causes the lug G''' to engage the sleeve 176ª thus presenting a yielding stop to the table to take the shock. When the pawl lever is drawn back the arm B''' is lowered and the lever A''' is swung against the rubber bumper and is in position for the next stop of the die table.

I claim—

1. In combination, in a machine for forming loops from slitted blanks, the means for spreading the slitted blanks, the trimming mechanism, the compressors for shaping the loop and the means for feeding the blanks to said mechanism, substantially as described.

2. In combination, in a machine for forming loops from slitted blanks, the means for spreading the blanks, the presser mechanism for forming the blank and the means for feeding the blanks while spread thereto, substantially as described.

3. In combination, in a machine for forming loops from slitted blanks, the carrier means for holding the blanks spread apart, the cutter mechanism for trimming the ends of the blank, the cutter mechanism for trimming both the upper and lower edges of the blank, and the compressor mechanism for shaping the blank to the form of the completed loop, substantially as described.

4. In combination, in a machine for forming loops from slitted blanks, the carrier means for holding the slitted blanks spread apart, the cutter mechanism for trimming both the upper and lower edges of the blanks and the compressor for shaping the blank, substantially as described.

5. In combination, in a machine for forming loops from slitted blanks, the cutter mechanism for trimming the edges of the blanks comprising the two cutters, the carrier and reversing means arranged to present one edge to one cutter and the other to the other cutter, and means for shaping the loop, substantially as described.

6. In combination, in a loop making machine, the means for holding and carrying the slitted blank, the trimming mechanism, the inking and dressing means and the compressor for shaping the blanks, substantially as described.

7. In combination, in a loop making machine, the compressor, the loop sticks, the carrier for the same, the means for carrying the blank to the loop sticks and the transfer means for placing the same thereon, substantially as described.

8. In combination, in a loop making machine, the loop sticks for receiving the blanks means for placing the blanks thereon, the dies arranged to press the blank thereon means for operating the dies and means for removing the loops, substantially as described.

9. In combination, in a loop machine, the pin for spreading the slitted blanks, the reciprocating table for forcing the blanks thereon, the stripper for moving the blank back to the table from the pin, the means for rotating the table, the carrier means for receiving the blank from the table when the same is reciprocated and the mechanism for acting on the blank while held by the carrier means, substantially as described.

10. In combination, in a loop machine, the pin for spreading the slitted blanks, the carrier means for the blanks, the means for shaping the blanks carried thereby, and the means for placing the blanks upon the spreader pin and upon the carrier, consisting of the table with means for reciprocating and rotating the same, substantially as described.

11. In combination, in a loop making machine, the pin for spreading the slitted blank, the carrier means, the table having the forked pins adapted to receive the slitted blanks, the stripper, the means for reciprocating and rotating the said table and reciprocating the stripper whereby the blank will be transferred from the forked pin to the spreader pin and to the outside of the forked pin and thence to the carrier and the means for shaping the blank, substantially as described.

12. In combination in a loop machine, the means for spreading the slitted blank, the table, the means for reciprocating and rotating the same, the pins carried by the table, the stripper, the carrier having arms depending over the table and the means for shaping the blank, substantially as described.

13. In combination, in a loop machine, the depending spreading pin, the table carrying yielding forked pins to co-act therewith, the means for reciprocating and rotating the table, the stripper, the head having radial arms to receive the blank, when spread, from the

forked pins, the means for rotating the said head at right angles to the rotary table and means for shaping the blank, substantially as described.

14. In combination, in a loop machine, the means for spreading the slitted blanks, the rotary head to receive the blank when spread, the presser mechanism arranged to press the ends of the blank and means for finishing the blank, substantially as described.

15. In combination, in a loop machine, the rotary head holding the slitted blank in spread condition, the presser mechanism for pressing the ends of the blank, a second rotary head, the trimming mechanism adjacent thereto and the transfer mechanism arranged to transfer the blank from one head to the other, substantially as described.

16. In combination, the rotary carrier bearing the radial arms for holding the slitted blank, the pressers for flattening the ends of the slitted blank means for operating the pressers and for retracting them out of the path of the radial arms, substantially as described.

17. In combination, the rotary carrier having the radial arms for the slitted blanks, the pivoted presser levers having the pressers at their front ends to press on the ends of the blank on opposite sides of the arm, and the means for opening and closing the levers and for retracting them out of the path of the radial arms, substantially as described.

18. In combination, the spreader for the slitted blank, the vertically movable bracket, the rotary table journaled therein to reciprocate with the bracket, the spring pressed pins carried by the rotary table, the carrier means for conveying the blanks when spread away from the rotary table, the means for shaping the blank and the means for rotating the table and for reciprocating the same, substantially as described.

19. In combination, in a loop machine, the rotary head having radial arms to receive the slitted blanks when spread, the knives arranged to reciprocate radially of the head and trim the blank held by the arms, the means for reciprocating the cutters and the means for shaping the blank, substantially as described.

20. In combination, in a loop machine, the rotary head having radial arms to receive the blank, the cutter operating at the end of the arm to trim the edge of the blank and the means for shaping the blank, substantially as described.

21. In combination, in a loop machine, the pair of rotary heads carrying radial arms to hold the blanks, the pair of trimming knives arranged to operate at the ends of the arms and transfer mechanism for transferring the blank from one head to the other and thus reversing the blank, substantially as described.

22. In combination, in a loop machine, the pair of rotary heads carrying radial arms to hold the blanks, the trimming knife operating at the end of the radial arm, the reciprocating carrier for said knife and the means for reciprocating the same and means for shaping the blanks, substantially as described.

23. In combination, in a loop making machine, a carrier head having radial arms for holding the loop, a sponge adapted to rotate around the radial arm and the loop held thereon, and a rotating reciprocating support for said sponge substantially as described.

24. In combination with the carrier head and arm, a sponge, a reservoir supporting said sponge and a conduit leading to the sponge with means for rotating and reciprocating the sponge support, substantially as described.

25. In combination, in a loop making machine, the compressor mechanism for shaping the blanks comprising the dies having oblique die surfaces, the inclined loop stick, the carrier having radial arms for holding the blank and the transfer mechanism and the means for turning the radial arms of the carrier and the blank carried thereby before placing the same on the loop stick, substantially as described.

26. In combination, in a loop making machine, the compressor mechanism for shaping the blank, the inclined loop stick, the carrier having radial arms adapted to rotate in their bearings and having pins projecting therefrom, the cam to engage the said pin for rotating the arm and the transfer mechanism for transferring the loop in inclined position on to the loop stick, substantially as described.

27. In combination, in a loop making machine, the compressor mechanism, the loop sticks, the carrier therefor, the means for feeding the blanks to the loop sticks and the reciprocating sleeve for placing the blank in position on the loop stick.

28. In combination, in a loop making machine, the loop sticks, the carrier therefor, the dies moving with the loop sticks and the compressor plungers for forcing the dies together, substantially as described.

29. In combination, in a loop making machine, the loop sticks, the carrier therefor moving step by step, the dies carried with the loop sticks, the compressor plungers, the means for locking the dies in closed position and the means for releasing the dies, substantially as described.

30. In combination, in a loop making machine, the dies the loop sticks, the means for carrying the same, the compressor plungers, the means for locking the dies in closed position and the means for closing the dies prior to their arrival at the compressors, substantially as described.

31. In combination, in a loop making machine, the dies the loop sticks, the carrier therefor, the levers carrying the dies, the compressor for forcing the dies together, the sleeve arranged to slide between the rear ends of the levers and the means for retracting the sleeves, substantially as described.

32. In combination, in a loop making machine, the dies, the loop sticks, the levers carrying the dies, the spring for opening the levers, the sliding sleeves on the rear ends of the loop sticks, the springs between the sleeves and carrier for forcing the sleeves into locking position, the compressors and the means for releasing the locking sleeves, substantially as described.

33. In combination, in a loop making machine, the dies having the oblique die surfaces, the inclined loop stick arranged to hold the blank between the dies, and means for placing the loops on the sticks, substantially as described.

34. In combination, in a loop making machine, the loop sticks, the rotary carrier therefor, the transfer mechanism at one station for transferring the loops to the loop sticks, the gage sleeve with means for reciprocating it to place the loop properly on the loop stick at another station, the compressor mechanism at another station and the discharge mechanism, substantially as described.

35. In combination, the rotary carrier, the dies carried thereby, the compressors for closing the dies, the locking sleeve, the releasing slide *n* and the means for operating the same, substantially as described.

36. In combination, in a loop making machine, the carrier, the loop stick, the shaping mechanism and the discharge mechanism comprising the gripper jaws and the means for opening and closing the same and reciprocating them, substantially as described.

37. In combination, in a loop making machine the dies the loop sticks, the compressor plungers and the means for reciprocating the same comprising the gearing, the loose belt wheel, the clutch and the cam for operating the same and throwing the belt wheel into and out of action, substantially as described.

38. In combination, in a loop making machine, the means for shaping the blanks, the rotary heads and the transfer mechanism for the blanks comprising the collars on the arms of the said carriers and the means for shifting the said collars along the said arms, substantially as described.

39. In a loop making machine, the means for shaping the loops, the rotary carriers or heads having radial arms arranged to align and the transfer mechanism comprising the bars with means for reciprocating them toward and from the radial arms and then longitudinally of the said arms, substantially as described.

40. In a loop making machine, the means for shaping the loops, the rotary carriers therefor having radial arms, and the transfer mechanism comprising the grooved collars on the arms, the latches to hold the collars in position and the transfer bars with means for operating them to engage and move the collars, said bars being arranged to release the latches of the collars, substantially as described.

41. In a loop making machine, the means for shaping the blank, the rotary carrier heads, the transfer bar, the lever and cam for reciprocating the same toward and from the carrier, the reciprocating rod connected to the transfer bar for moving it between the carrier heads and the lever and cam for operating said rod, substantially as described.

42. In a loop making machine, the means for shaping the blank, a series of rotary carrier heads having radial arms adapted to align with each other, the pawl and ratchet mechanism connected with the carriers, the transfer mechanism between the carriers and the rack bar having teeth engaging the pawl and ratchet mechanism of the several carriers, substantially as described.

43. In combination, in a loop making machine, the shaping mechanism, the series of rotary heads, one of which has movement reversed from that of the others, pawl and ratchet mechanism and the rack bar engaging the pawl and ratchet mechanism of the several carriers, substantially as described.

44. In a machine for making loops from slitted blanks, the means for spreading the blanks, the means for pressing the ends, the trimming means for trimming the ends, the means for trimming the edges of the blanks, the blacking and dressing means the compressor mechanism for shaping the blanks and transfer means between the different mechanisms, substantially as described.

45. In combination, the trimming knives, the blank holder, the movable supports for the knives, the bearing block to press on the blank at one point, and the connections therefrom to the knives, whereby their position will be automatically adjusted, substantially as described.

46. In a machine for making loops, the trimming knives, the movable supports therefor, the connection extending between the supports, the block, the link supporting the same and the pivoted piece between the block and one knife support, substantially as described.

47. In a loop making machine, a series of rotary heads, shaping and finishing mechanism, means for moving the heads step by step, and the stop mechanism comprising the pins and the levers and operating means therefor, substantially as described.

48. In a loop making machine, the series of rotary heads, the shaping and finishing mechanism, means for moving the heads step by step, the series of stop pins, the levers, the shaft carrying the said levers and the cam for operating the shaft, substantially as described.

49. In combination, the carrier having radial arms for the blanks, the inking means, the distributer and rubbing device the rotat-

ing support therefor arranged axially of the radial arm, means for carrying the blank from the inking means to the distributer and means for operating the distributer, substantially as described.

50. In combination, in a loop making machine, the shaping and finishing mechanism, the rotary table and the yielding stop therefor yielding in the direction of the movement of the table, substantially as described.

51. In combination, in a loop making machine, the shaping and finishing mechanism, the rotary table, the stop pin therefor with means for operating it and a yielding stop arranged to take the shock, substantially as described.

52. In combination, in a loop making machine, the shaping and finishing mechanism, the rotary carrier table, the means for operating it and the stop yielding in the direction of the movement of the table with means for operating it into and out of line with a part of the rotary table, substantially as described.

53. In combination, in a loop making machine, the shaping and finishing mechanism, the rotary carrier table, the horizontally yielding stop comprising the spring lever A‴, the arm B‴ to which the said stop is pivoted, the said arm B‴ being pivotally supported and the means for operating the arm B‴, substantially as described.

54. In combination, in a loop machine, the shaping and finishing mechanism, the rotary carrier table, the horizontally yielding stop, the vertically swinging arm B carrying the same, the pawl and ratchet for moving the table, the pawl lever and the connection therefrom to the swinging arm B for operating the same, substantially as described.

55. In combination, in a loop machine, the shaping and finishing mechanism, the carrier table, the loop sticks and the discharge mechanism comprising the grippers pivoted to open and close, the latch for holding them open, the means for releasing the latch to allow them to close and the means for opening the grippers, substantially as described.

56. In combination, in a loop machine, the shaping and finishing mechanism, the carrier table, the loop sticks thereon, and the discharge mechanism comprising the grippers, adapted to open and close, and the means for opening them consisting of the inclines thereon and the bearings in the frame, substantially as described.

57. In combination, in a loop machine, the shaping and finishing mechanism, the rotary carrier table, and the discharge mechanism comprising the grippers arranged to open and close, the latch for holding them in both open and closed position, the means for releasing the latch and the inclines and bearings for opening the grippers, substantially as described.

58. In combination, in a machine for forming loops from slitted blanks, means for spreading the slitted blanks, and compressing mechanism for shaping the loops and transfer mechanism substantially as described.

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

JOHN K. BIGELOW.

Witnesses:

JOHN L. BOONE,

BERT SCHLESINGER.