

(No Model.)

17 Sheets—Sheet 1.

C. O. WHITE & M. B. LLOYD.
APPARATUS FOR WEAVING COILED WIRE FABRIC.

No. 605,831.

Patented June 14, 1898.

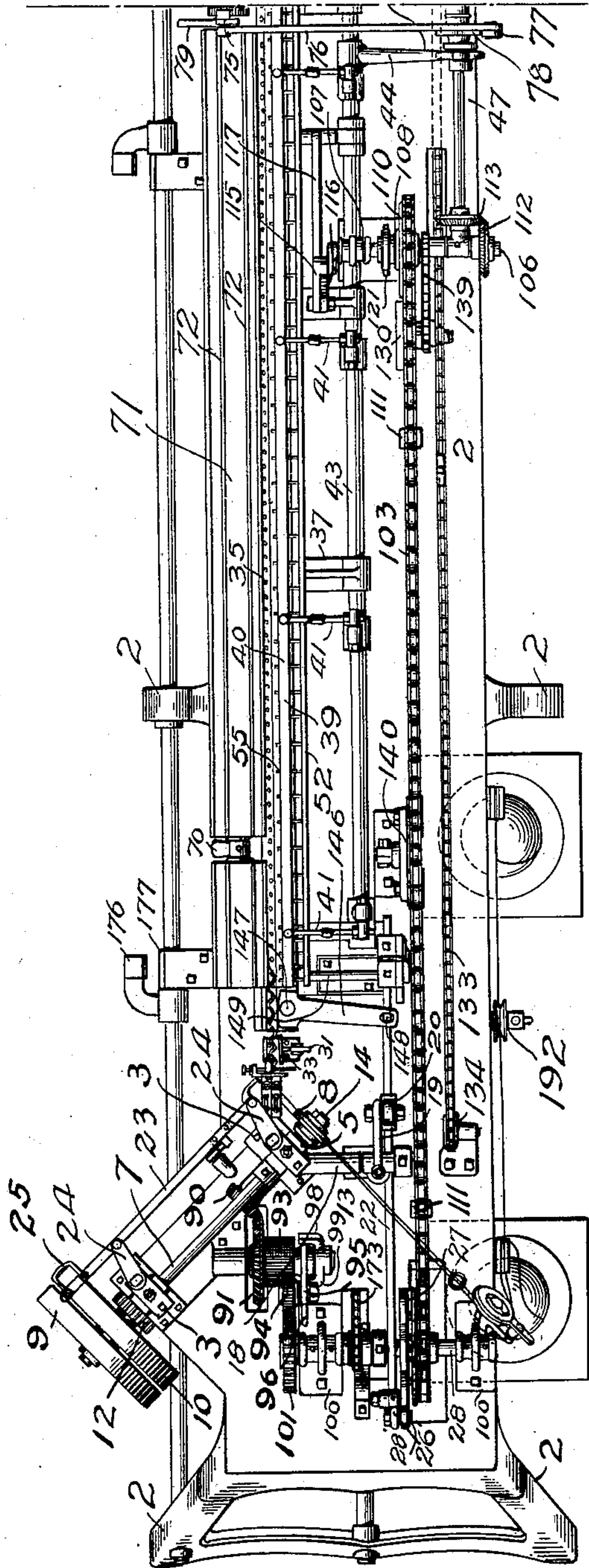


Fig. 1.

Witnesses;
C. E. Van Dorn,
W. E. Cooley.

Inventors;
Clarence O. White,
Marshall B. Lloyd.
By Paul Hawley
their Attorneys.

(No Model.)

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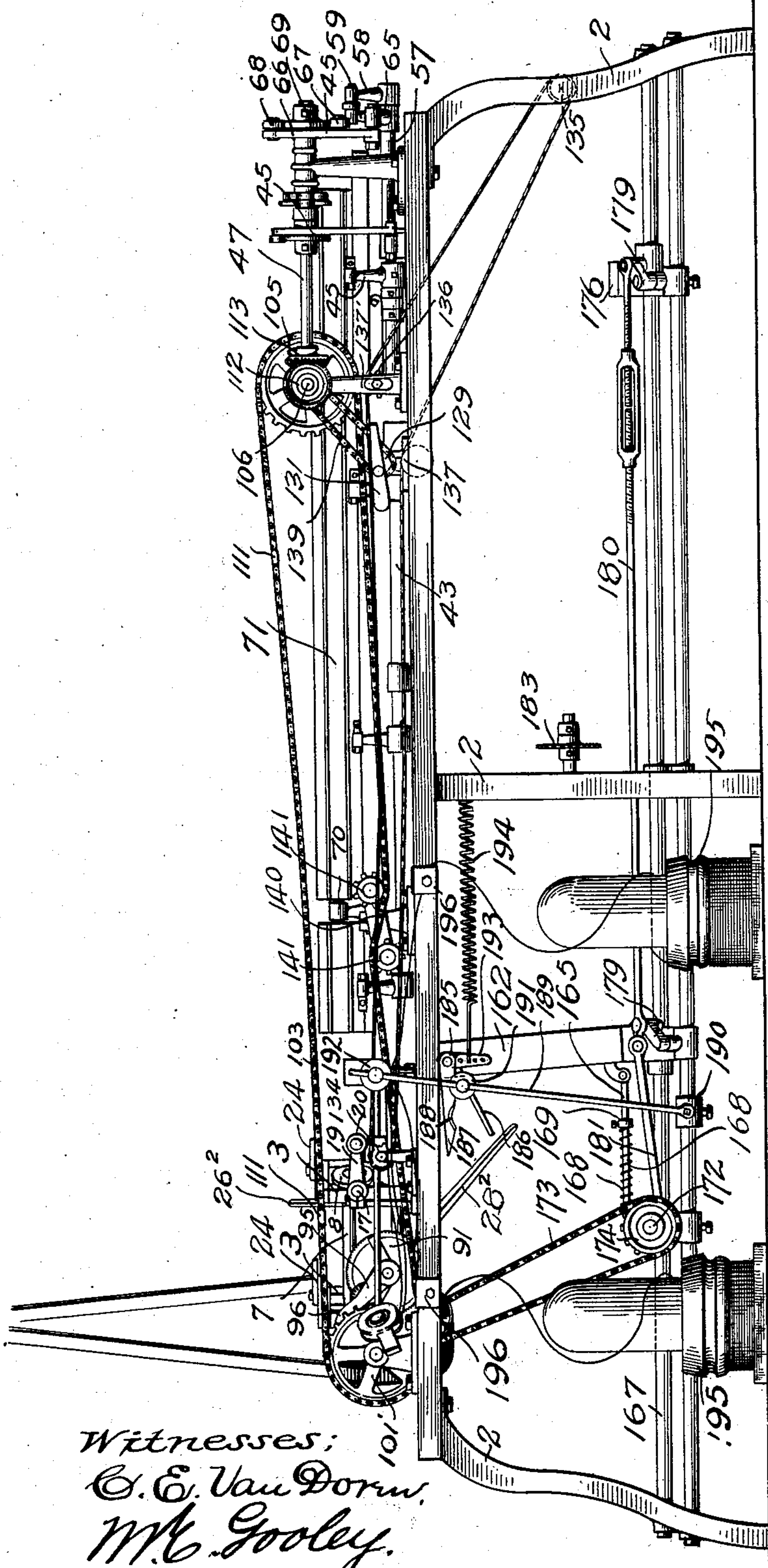


Fig. 2.

Witnesses:
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17 Sheets—Sheet 3.

No. 605,831.

Patented June 14, 1898.



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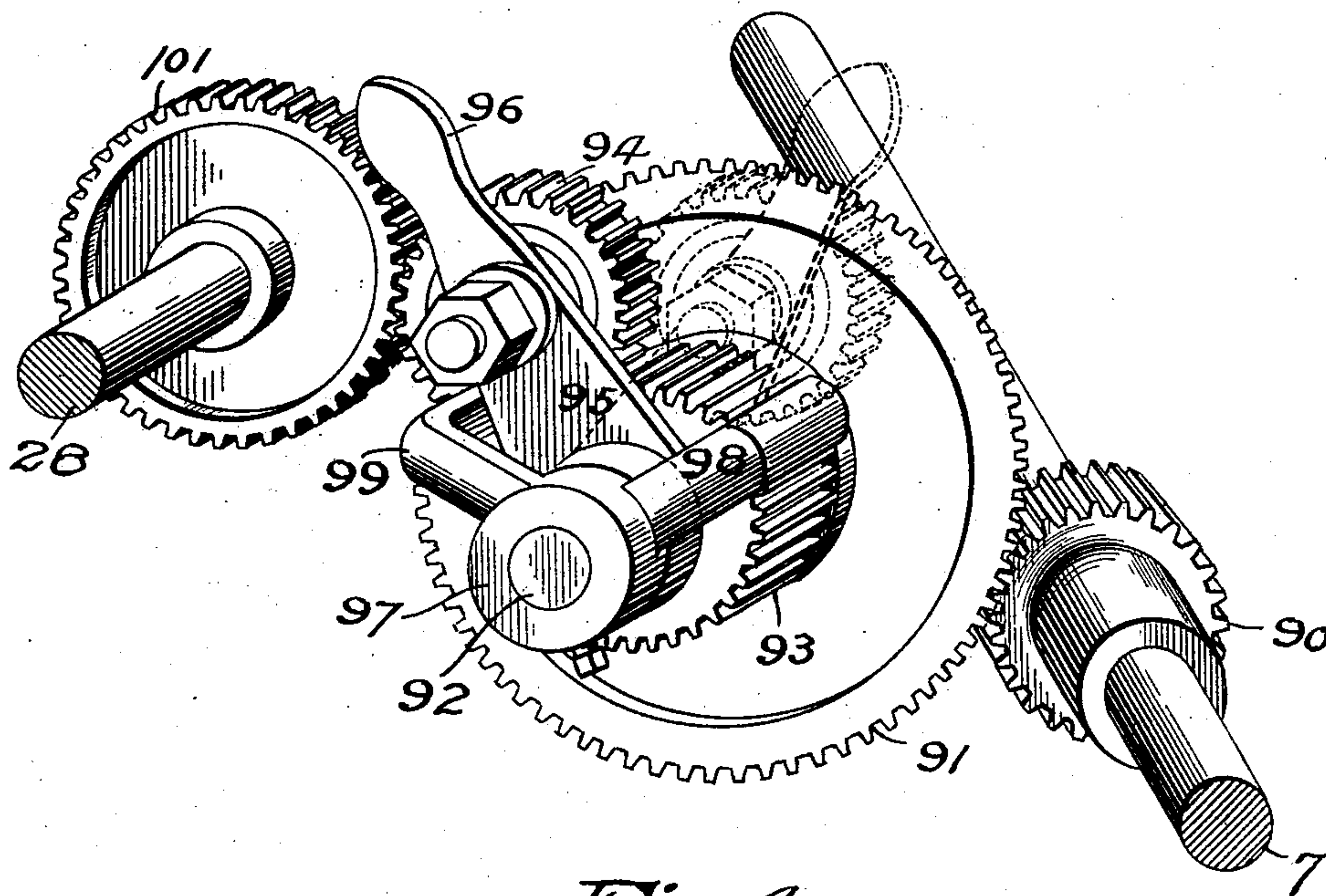


Fig. 4.

Witnesses;
C. E. Van Dorn
M. E. Gooley

Inventors;
Clarence O. White.
Marshall B. Lloyd.
By Paul H. Hawley
their Attorneys.

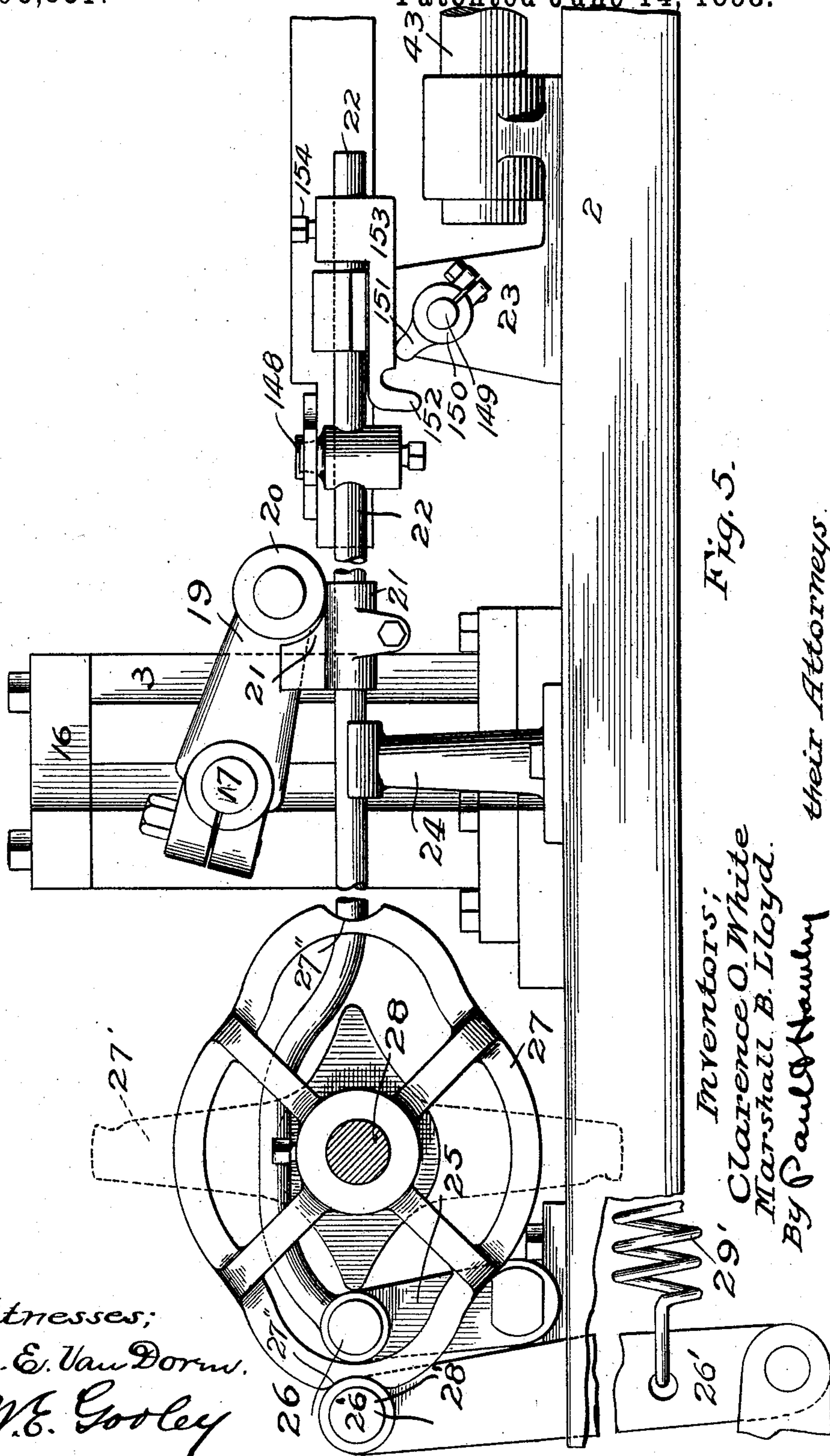
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Witnesses;
C. E. Van Dorn.
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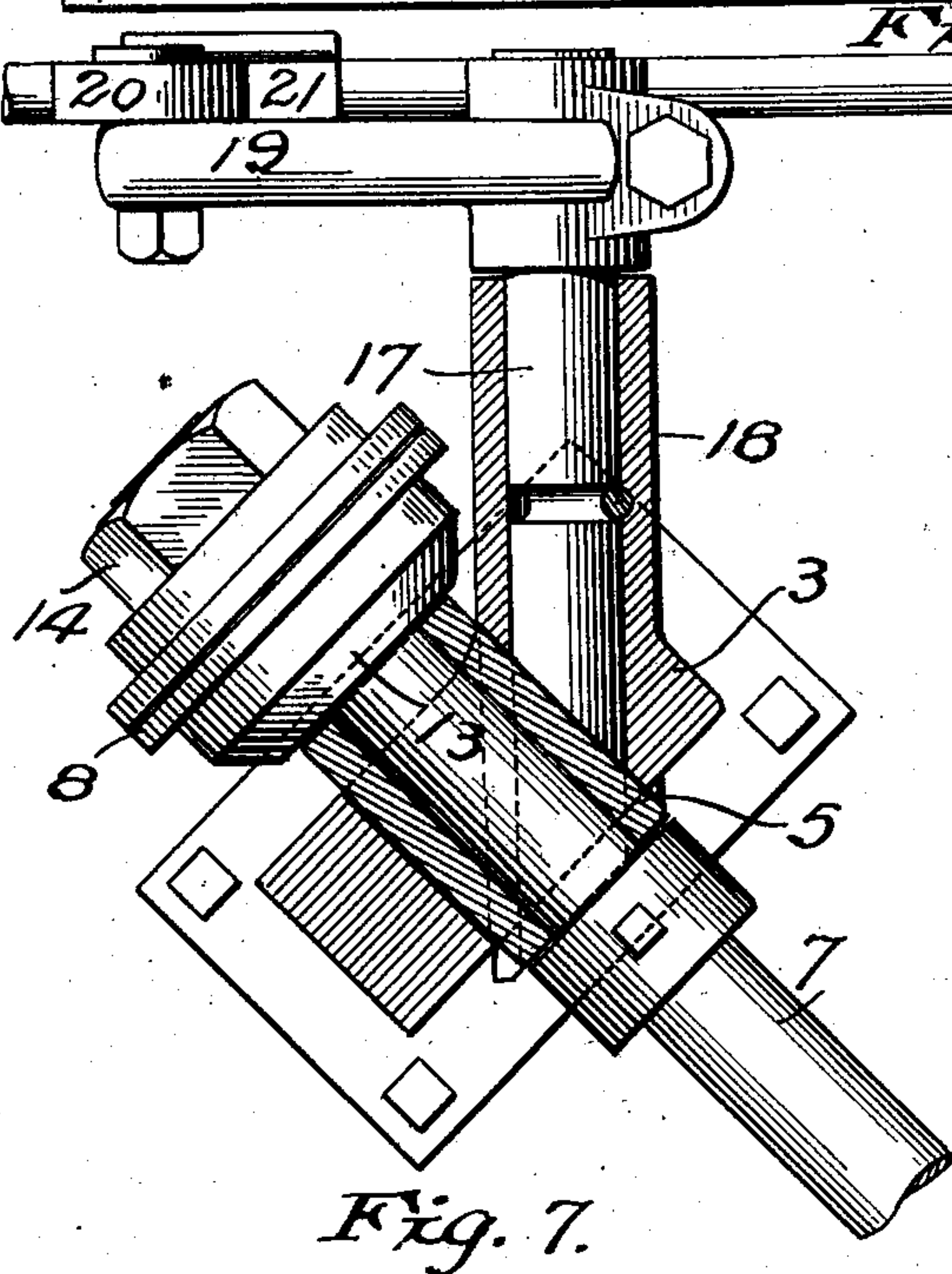
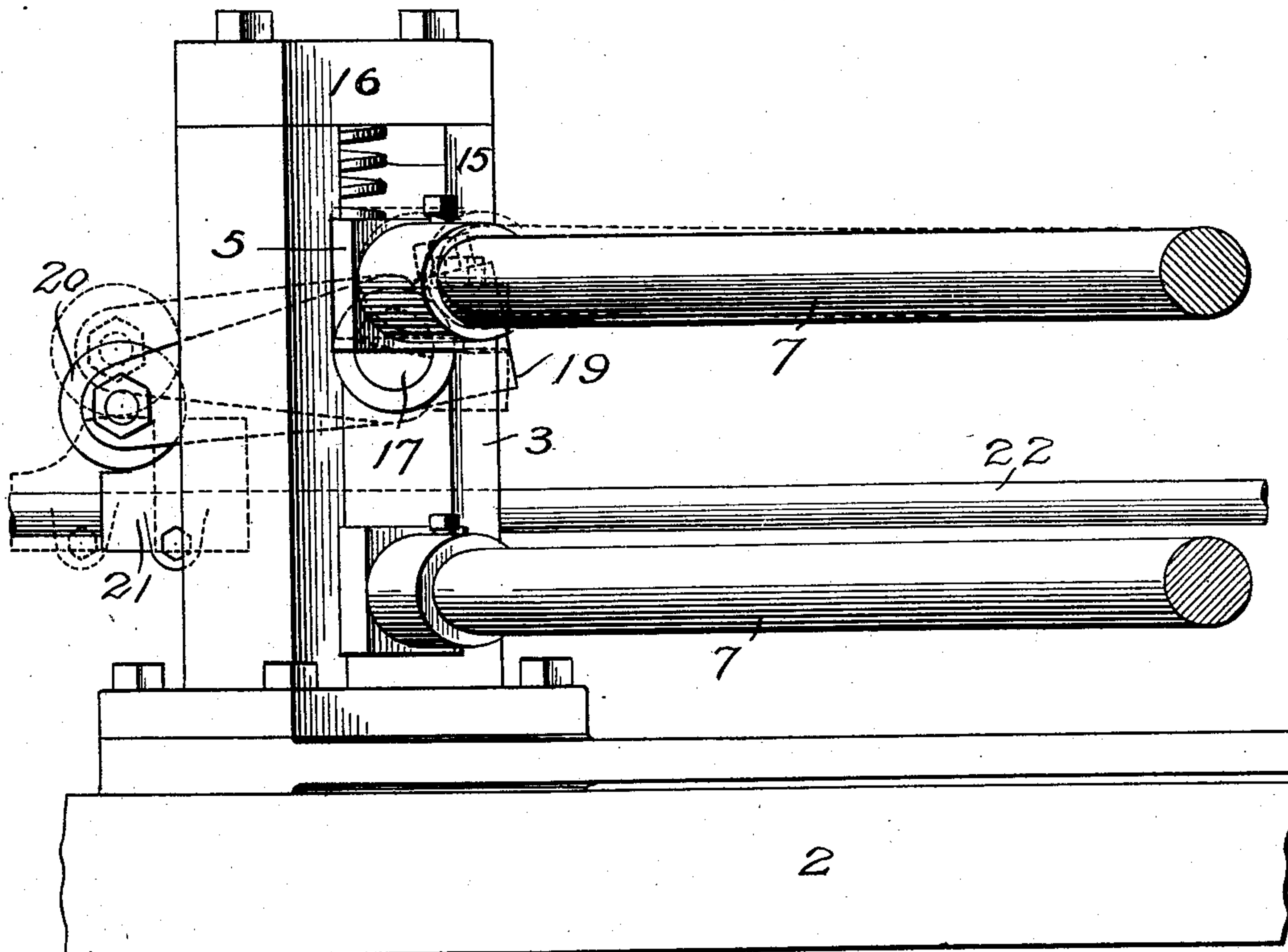
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Witnesses;
C. E. Van Dorn
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Clarence O. White,
Marshall B. Lloyd.
By Paul & Stanley
their Attorneys.

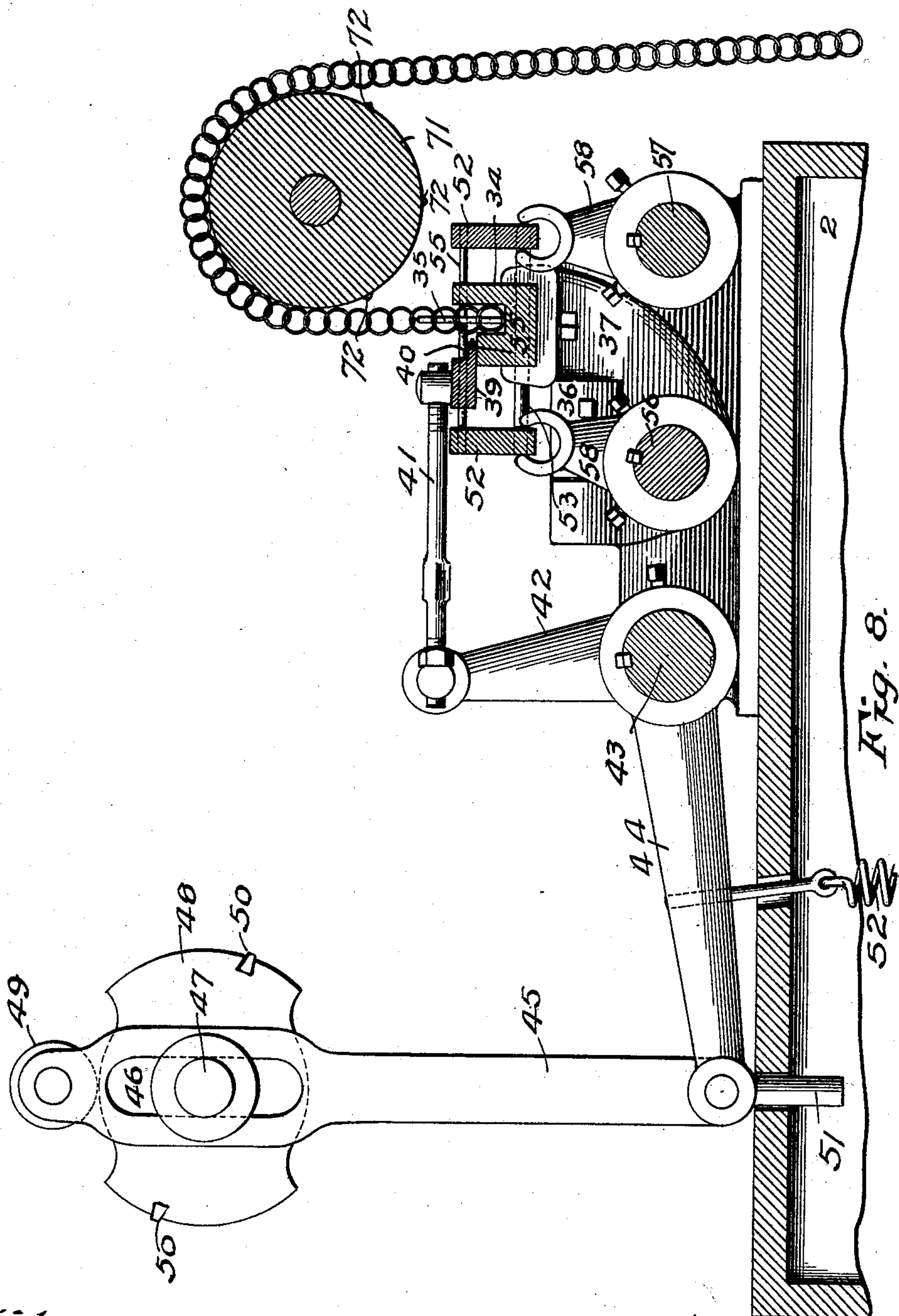
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Inventors;
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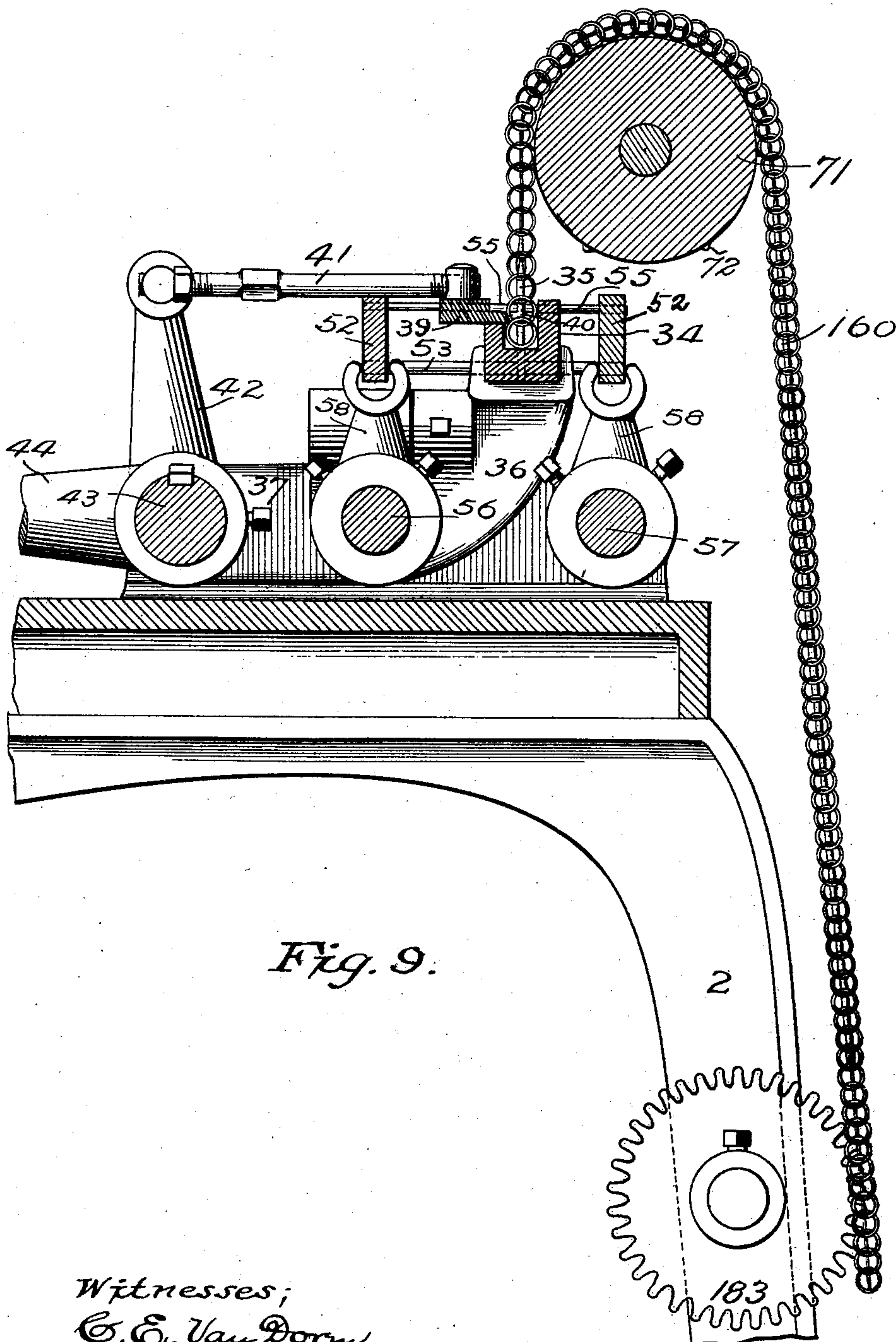
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M. E. Gooley

Inventors
Clarence O. White.
Marshall B. Lloyd
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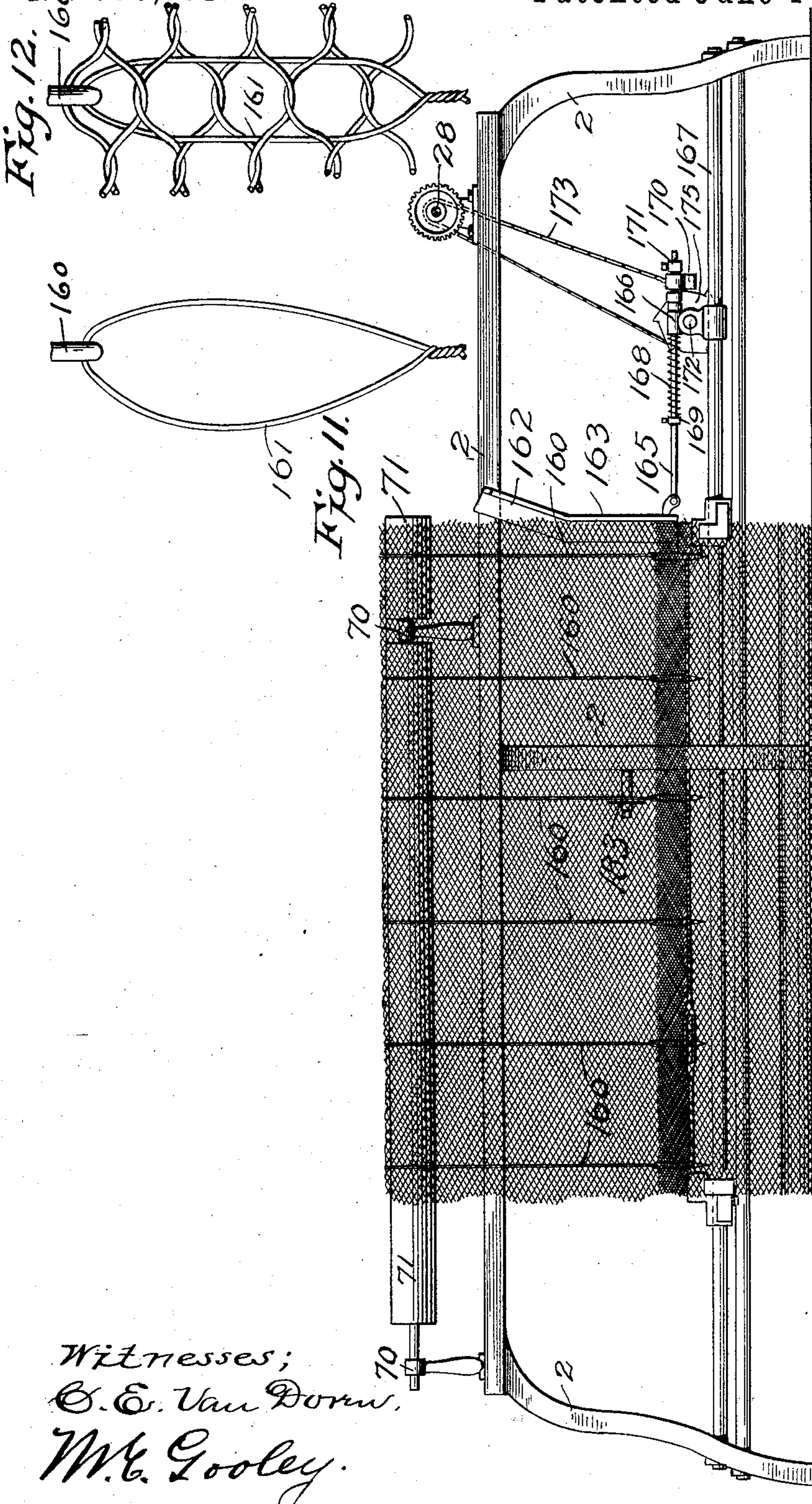
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Witnesses;
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(No Model.)

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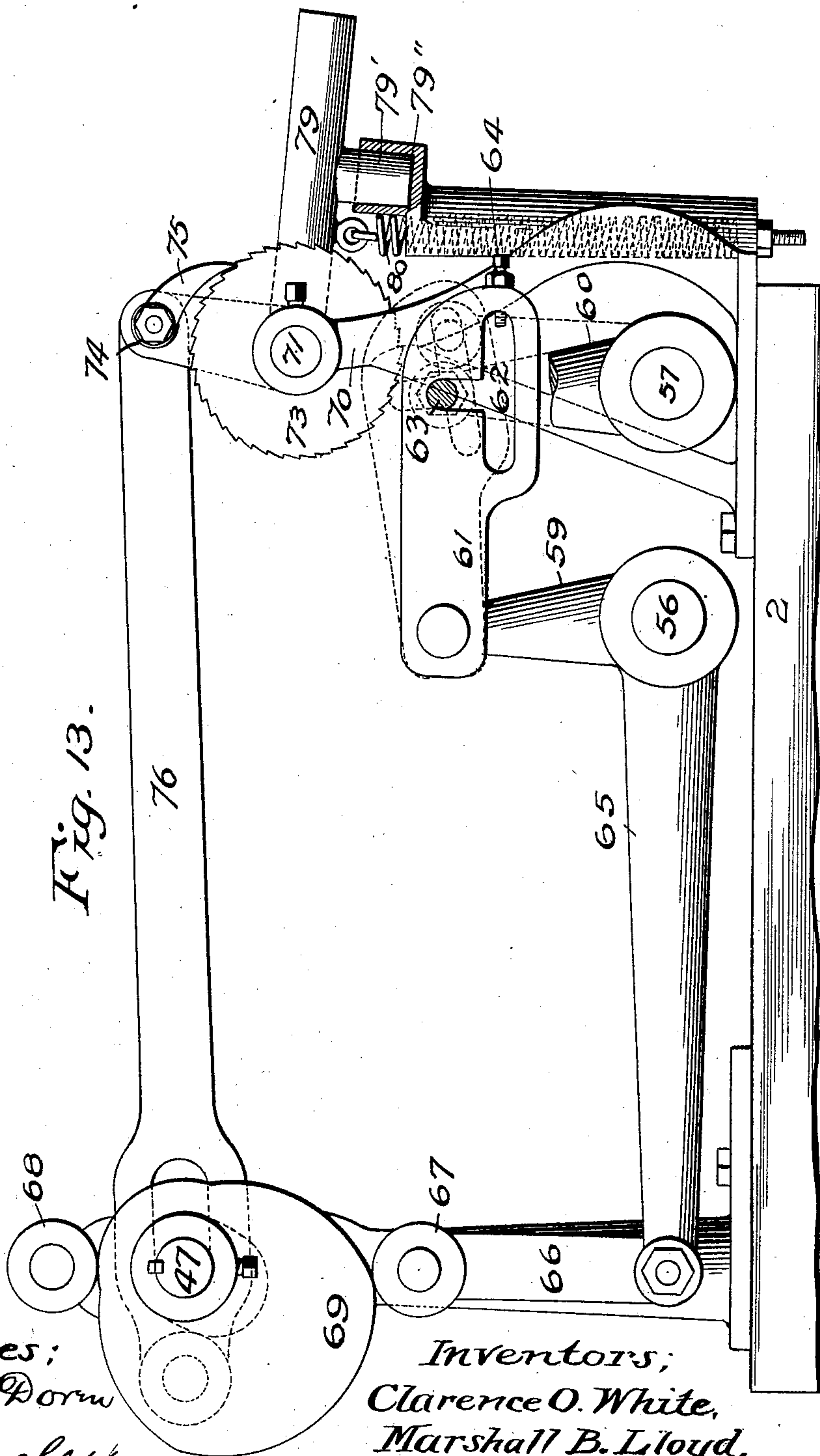


Fig. 13.

Witnesses;
C. E. Van Dorn
W. B. Gooley.

Inventors;
Clarence O. White,
Marshall B. Lloyd.
By Paul Hawley
their Attorneys.

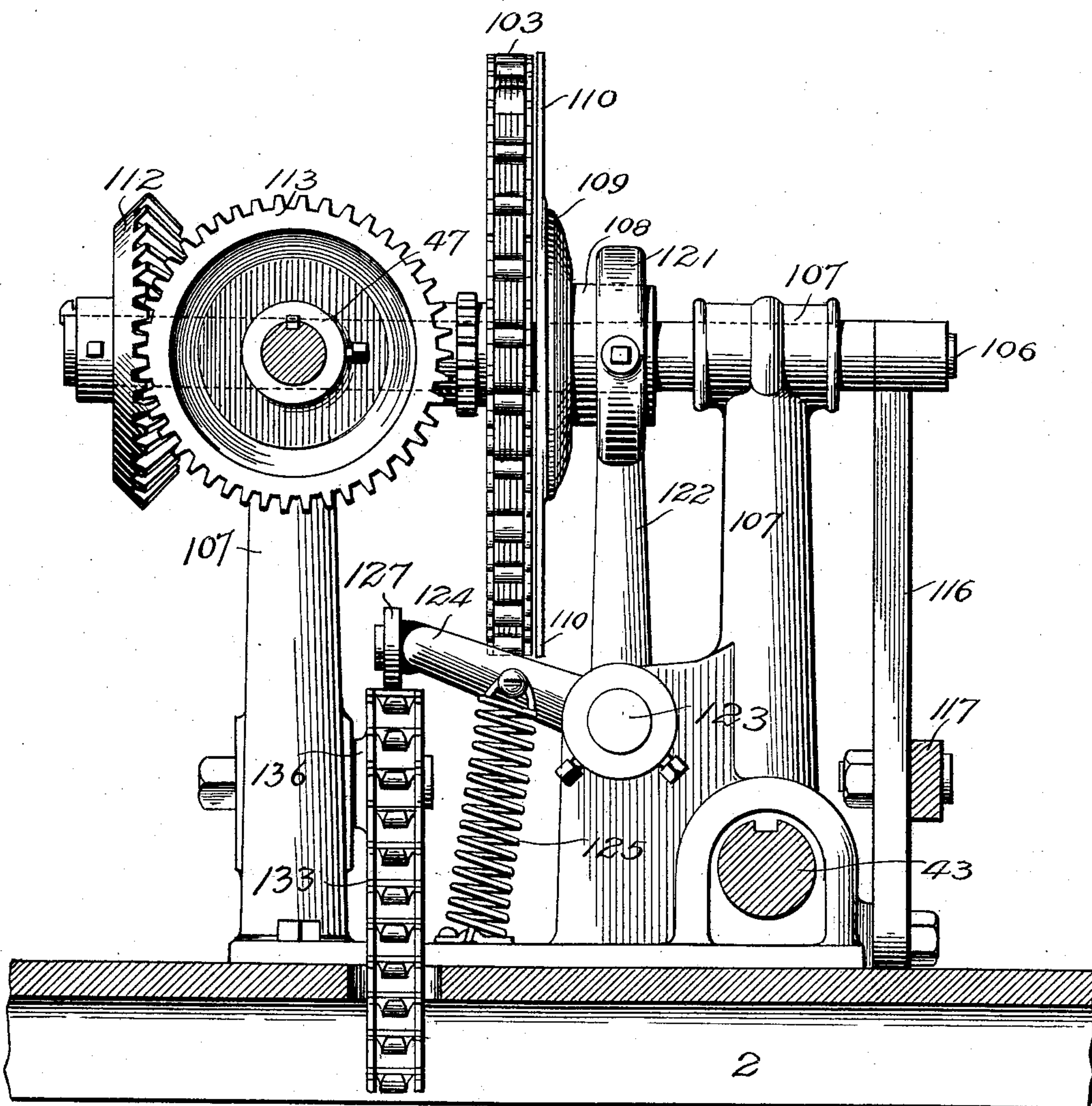
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Witnesses;
C. E. Van Dorn

Fig. 14.

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Clarence O. White.
Marshall B. Lloyd.

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(No Model.)

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C. O. WHITE & M. B. LLOYD.

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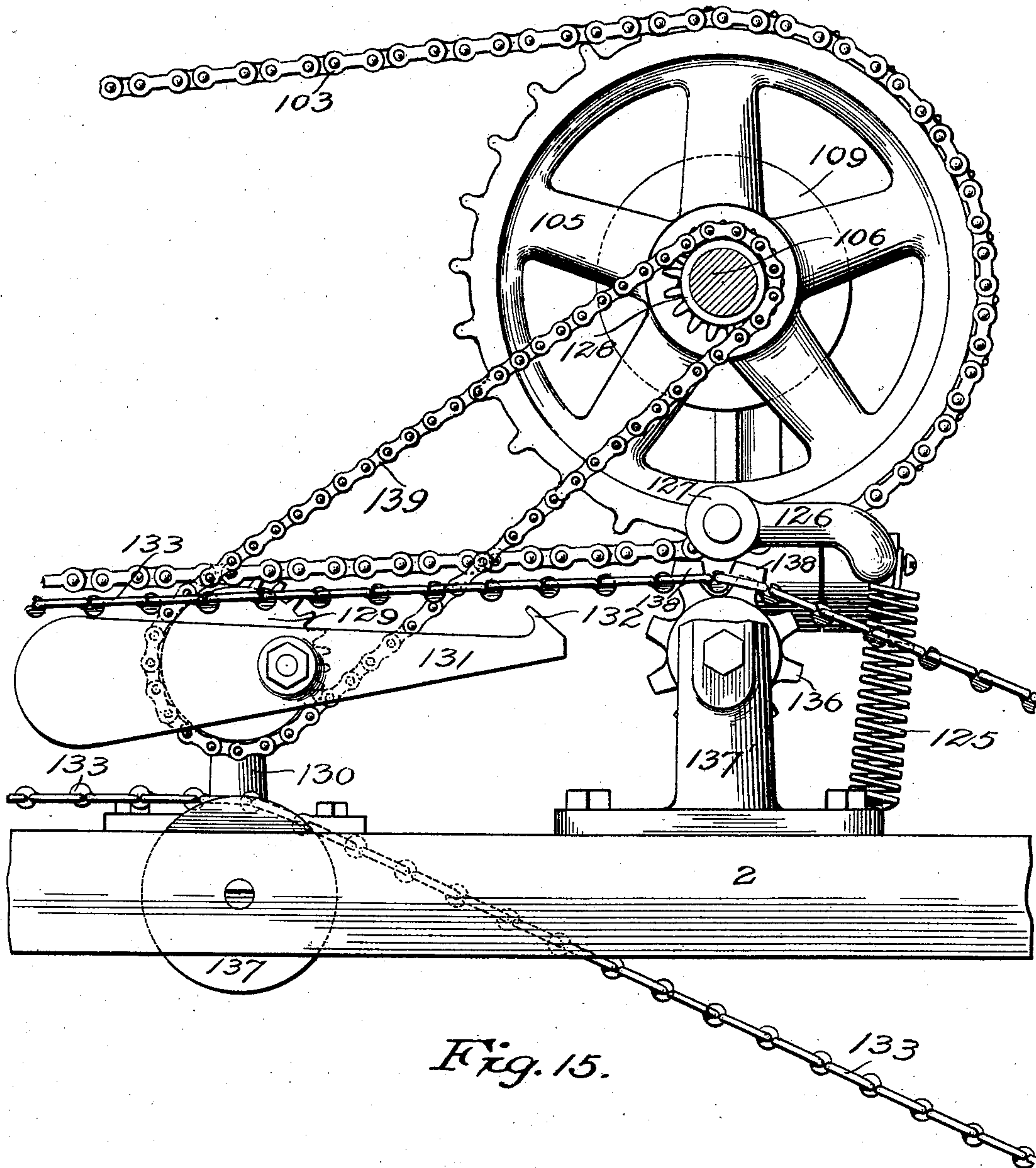


Fig. 15.

Witnesses;

C. E. Van Dorn

M. E. Gooley.

Inventors;

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Marshall B. Lloyd,

By Paul & Stanley
their Attorneys.

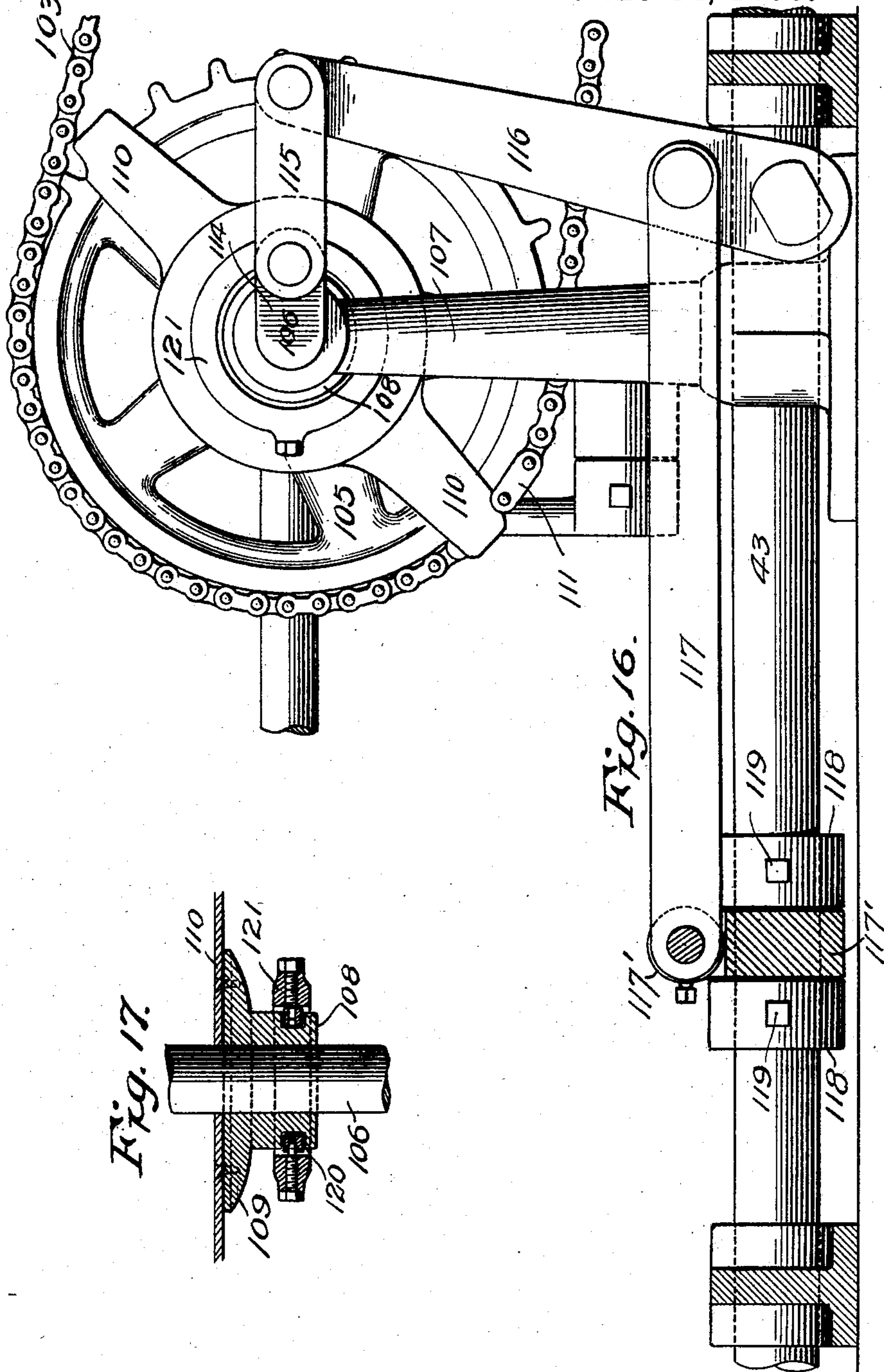
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Witnesses;
C. E. Van Dorn,
W. E. Gooley

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17 Sheets—Sheet 14.

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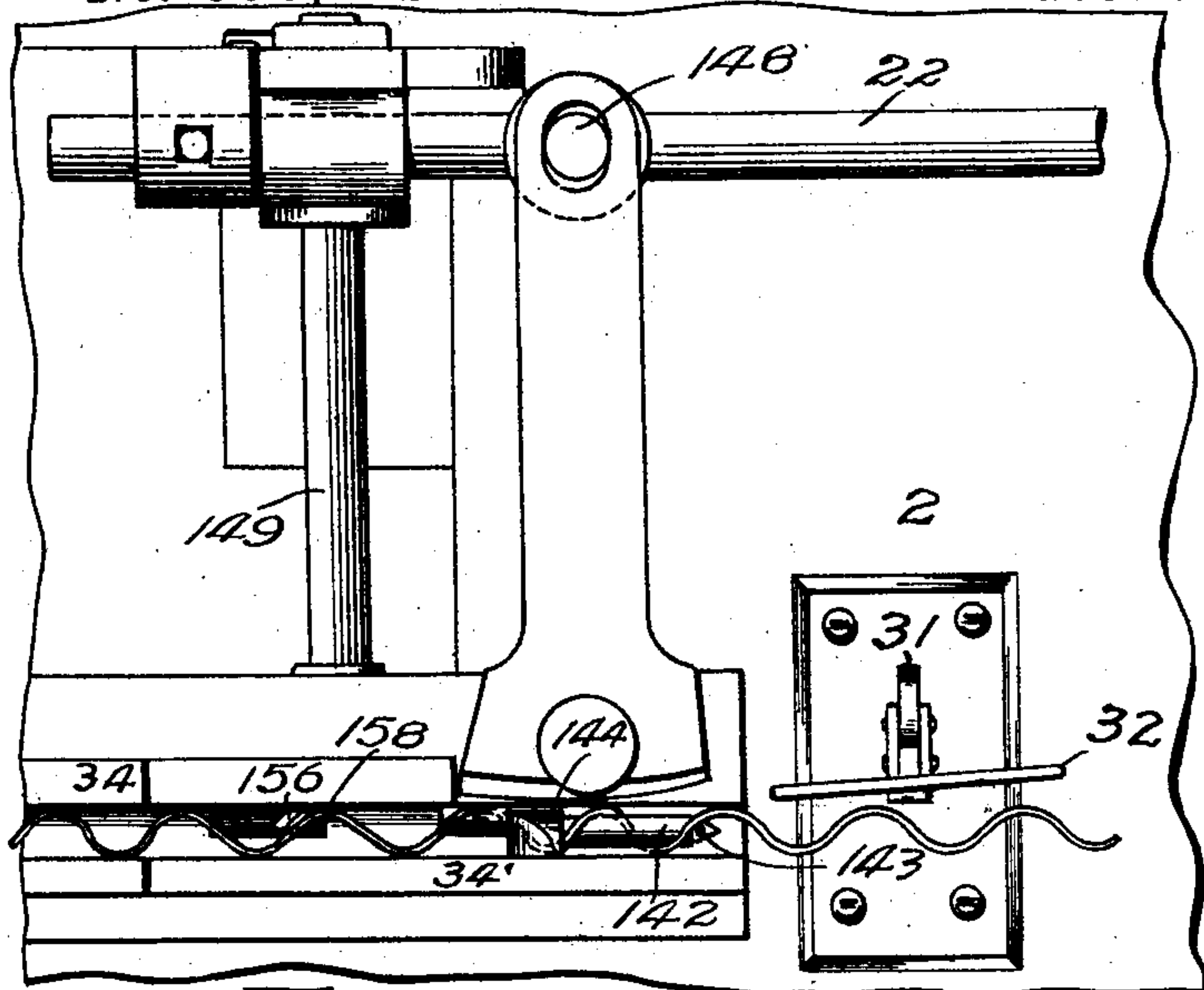


Fig. 18.

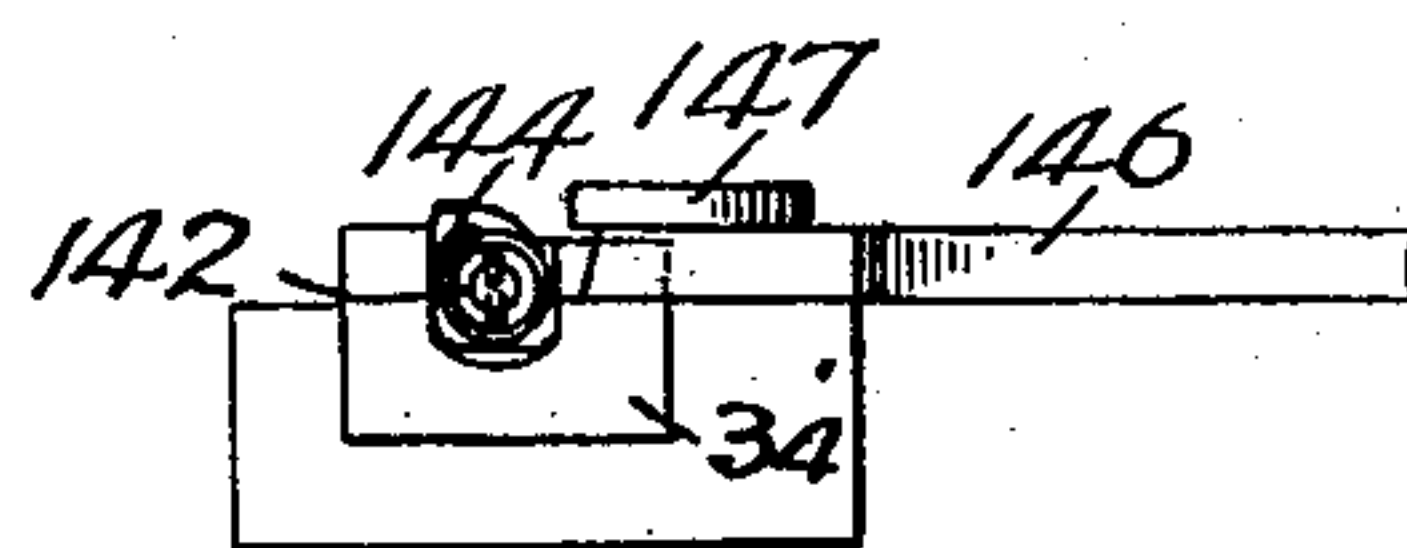


Fig. 19.

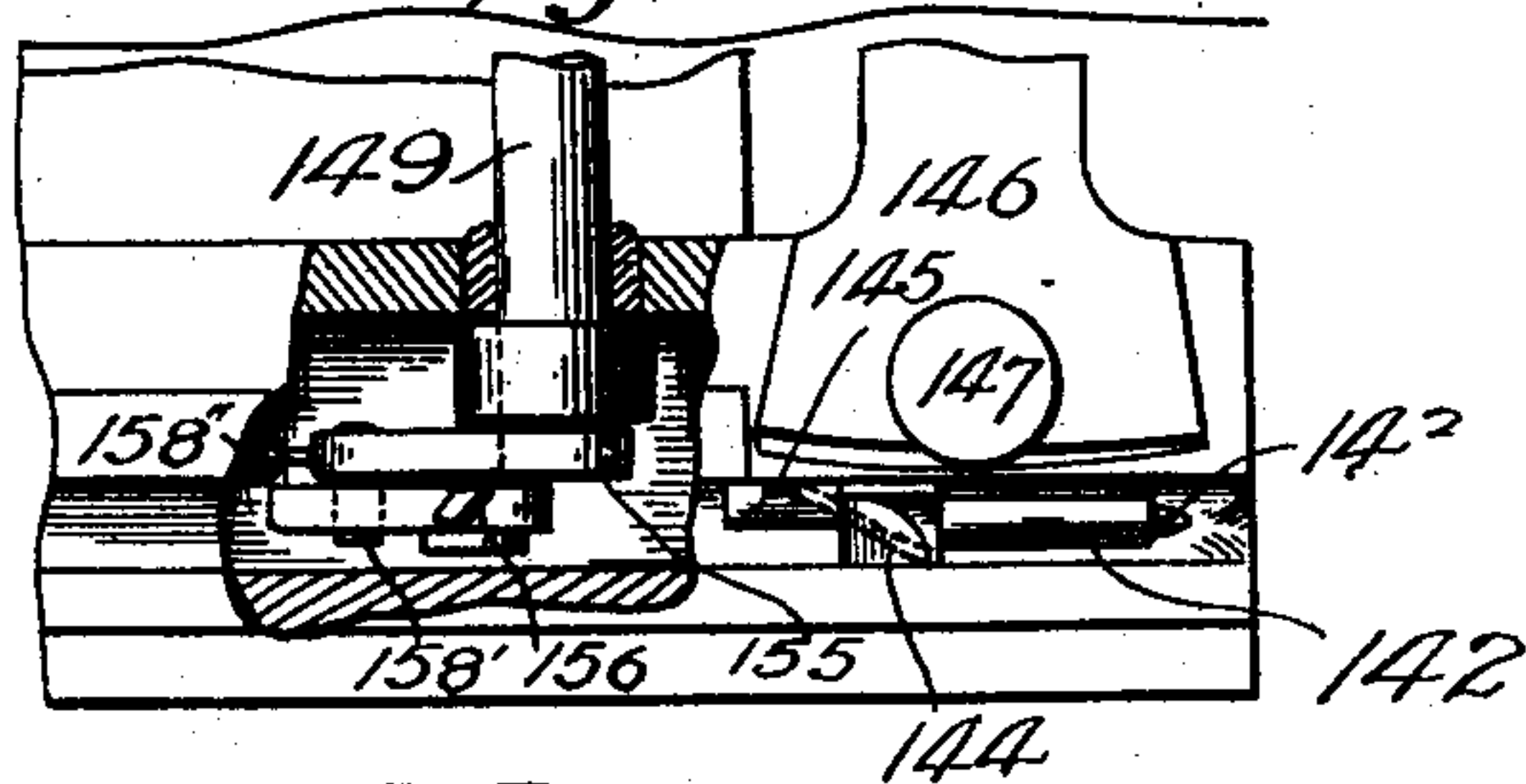


Fig. 20.

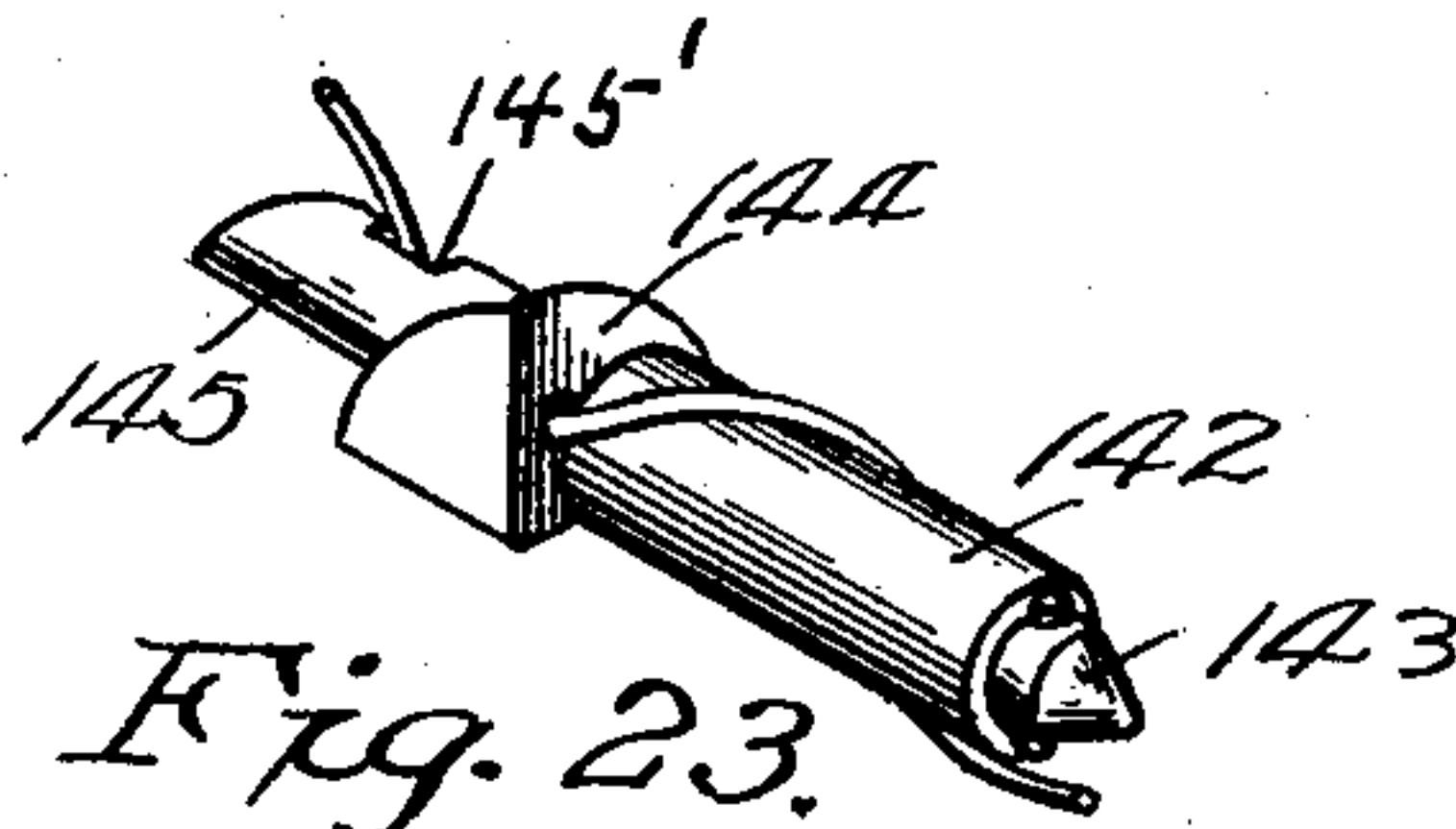


Fig. 23.

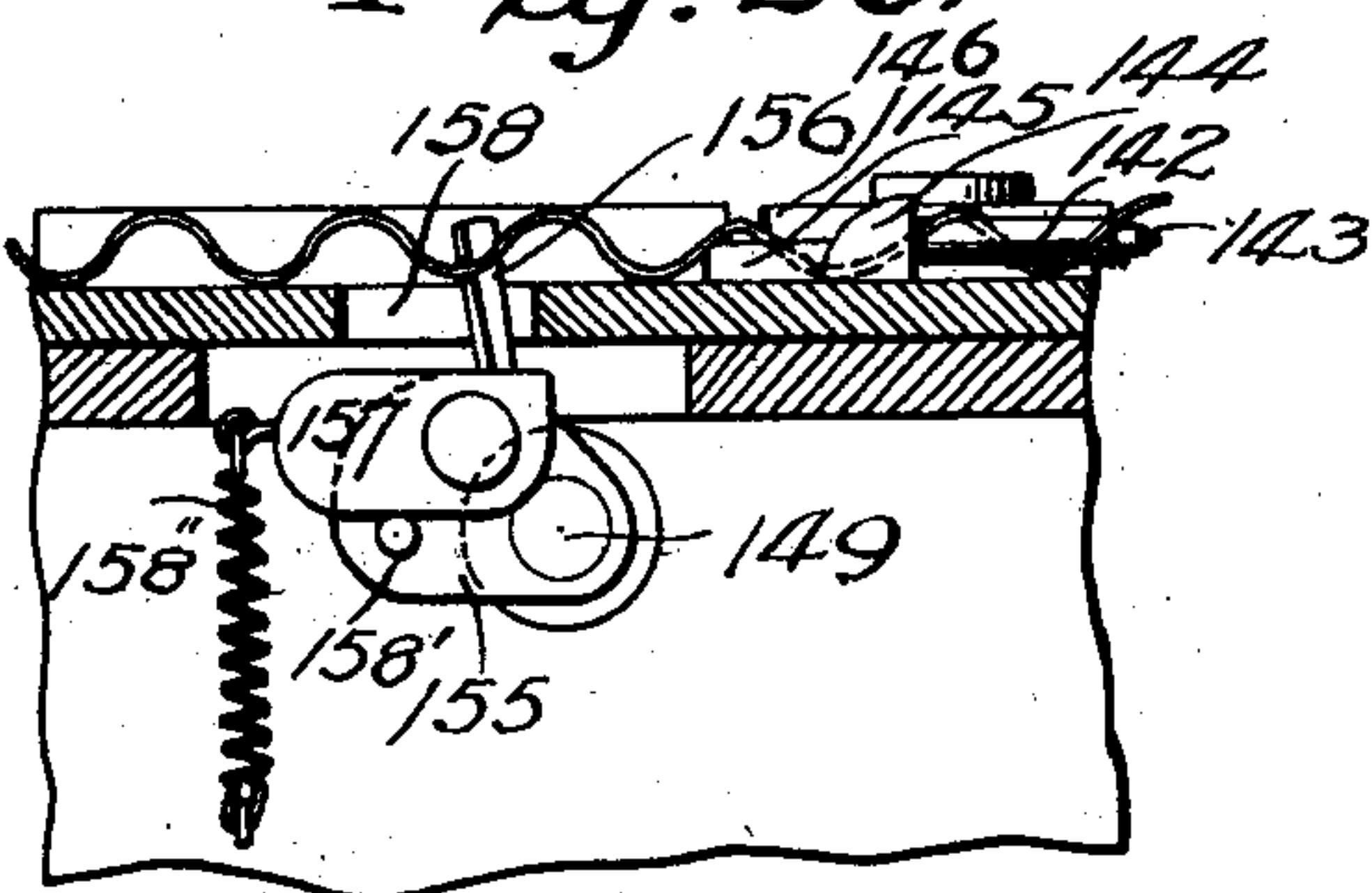


Fig. 21.

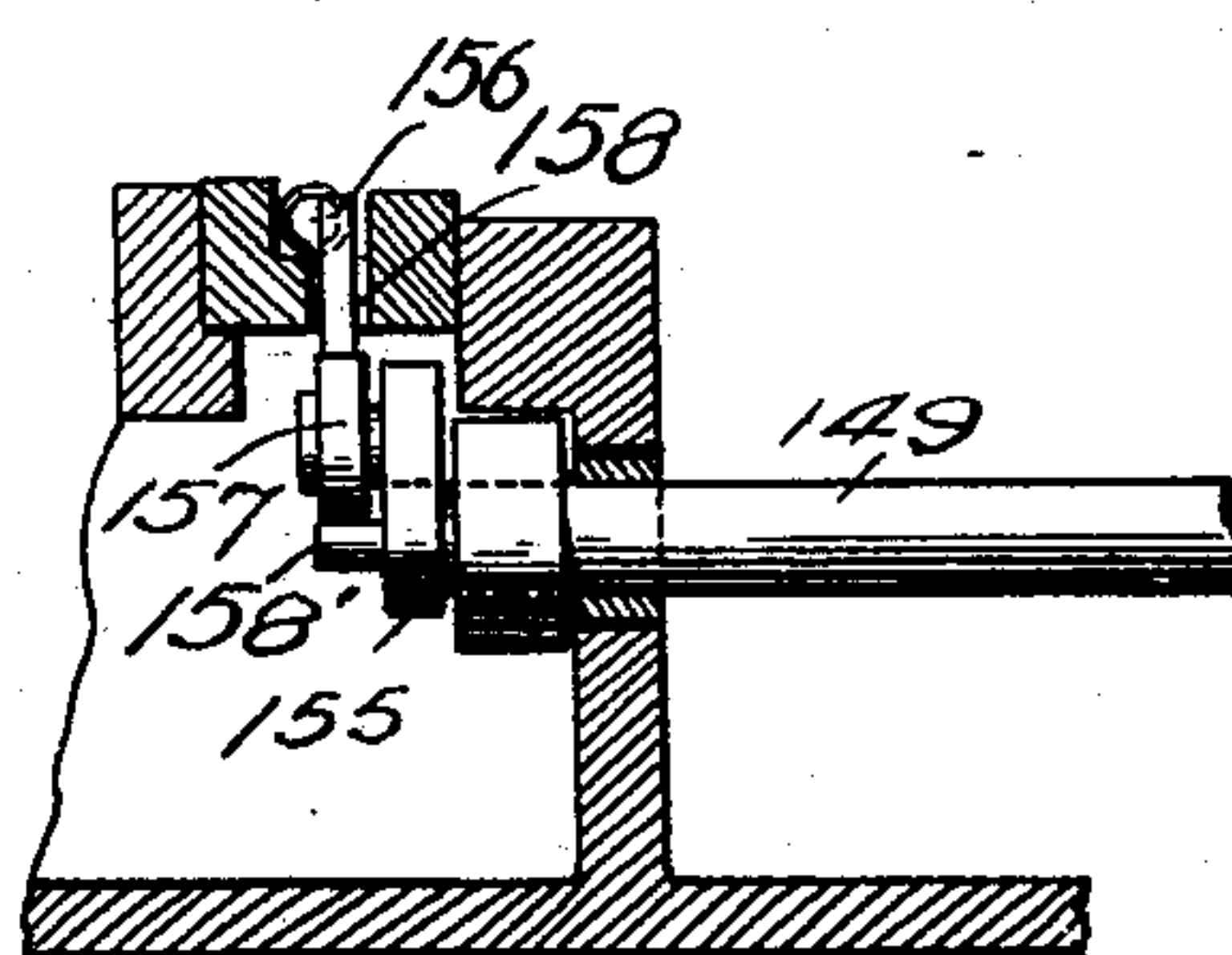


Fig. 22.

Witnesses;
C. E. Van Doren.
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Inventors;
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(No Model.)

17 Sheets—Sheet 15.

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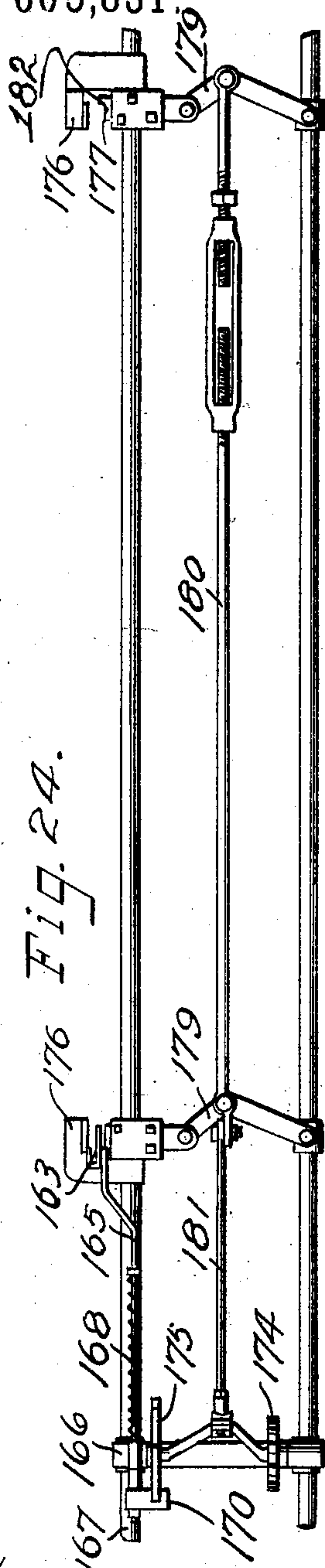


Fig. 24.

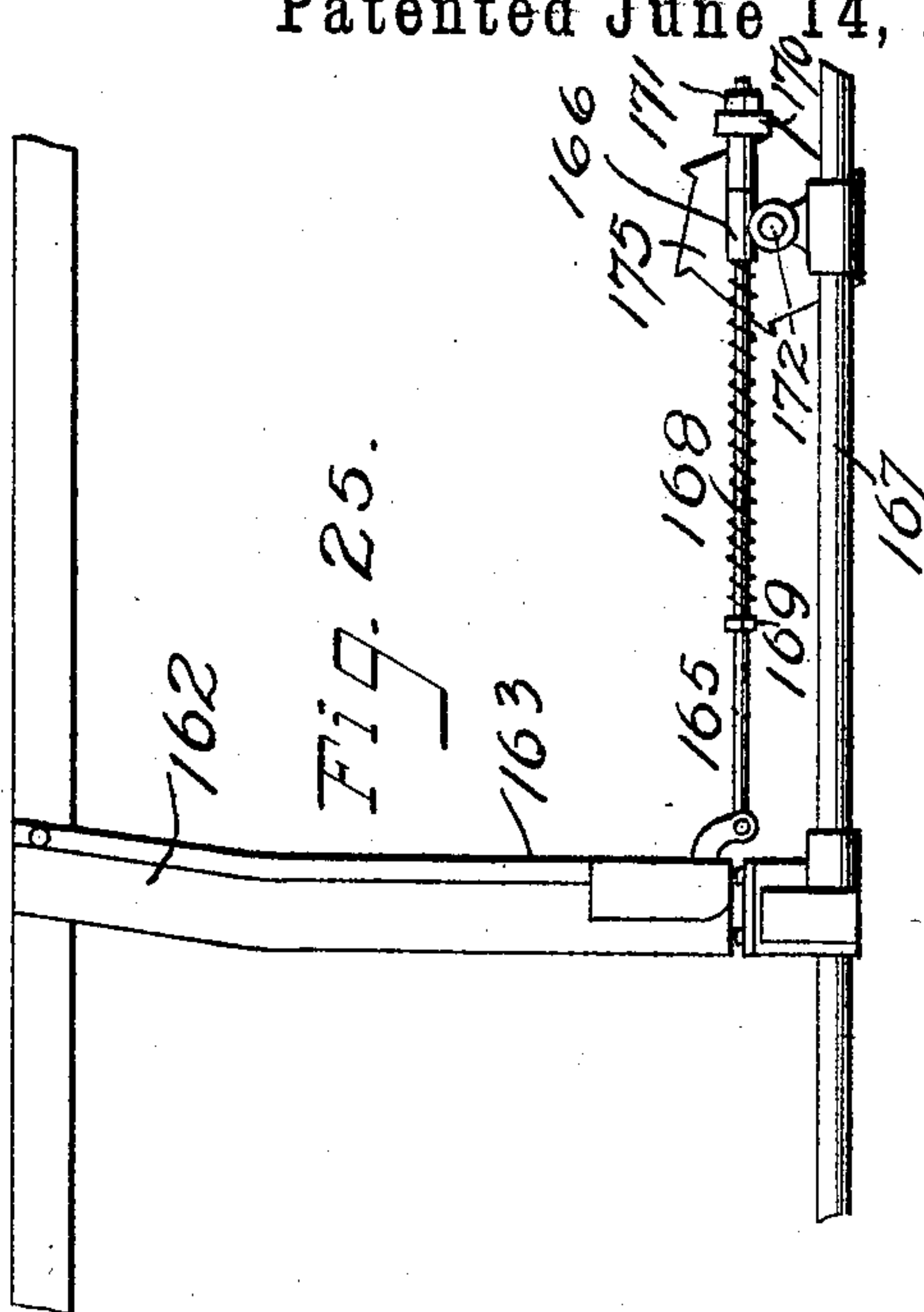


Fig. 25.

WITNESSES
C. E. Van Dorn,
M. E. Gooley.

INVENTORS,
Clarence O. White,
Marshall B. Lloyd,
By Paul & Hawley
their attorneys

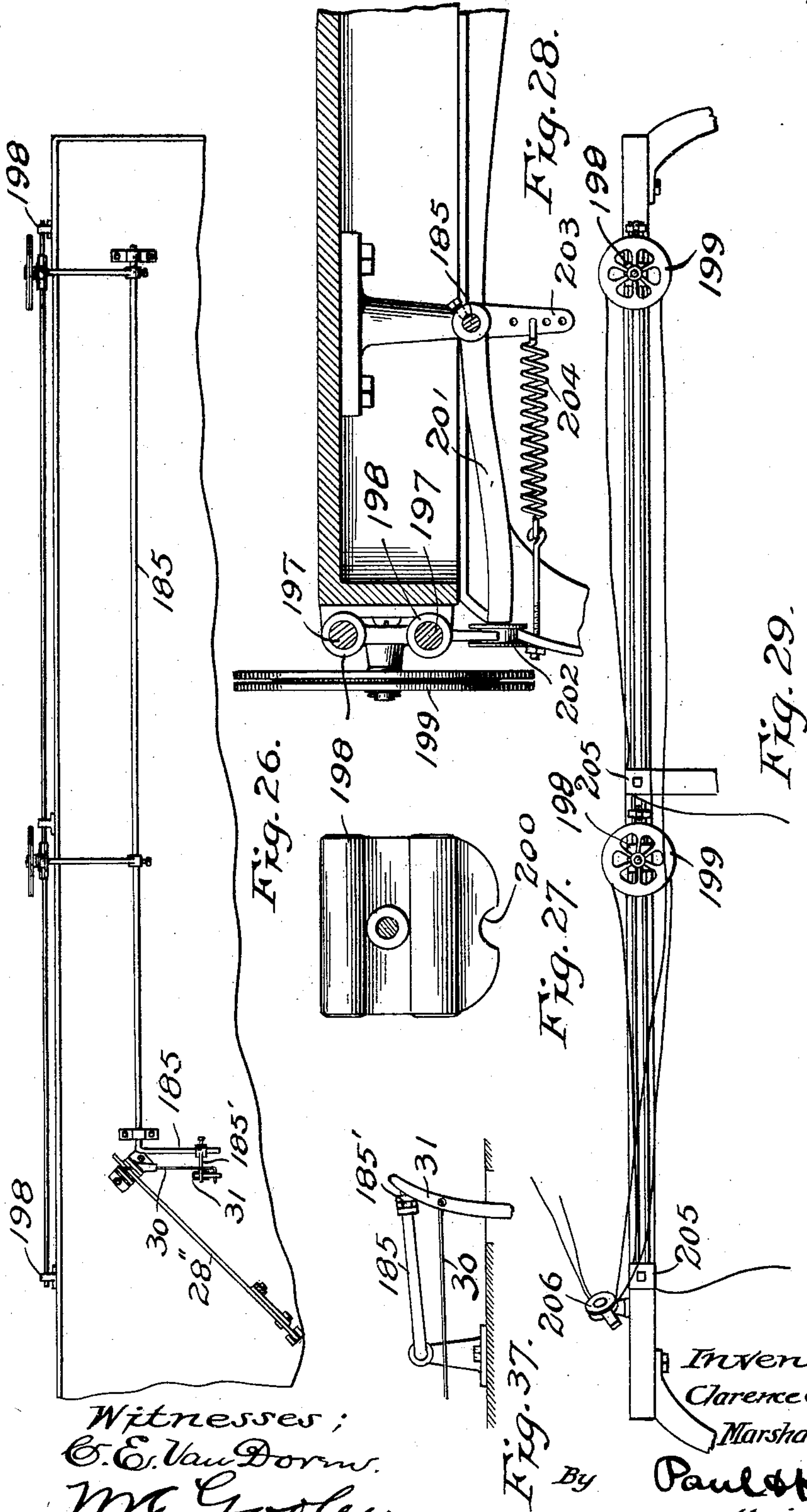
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17 Sheets—Sheet 16.

C. O. WHITE & M. B. LLOYD.
APPARATUS FOR WEAVING COILED WIRE FABRIC.

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Patented June 14, 1898.



Witnesses;
C. E. Van Dorn.
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Fig. 37. 206
By

Inventors;
Clarence O. White
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their Att'ys.

17 Sheets—Sheet 17

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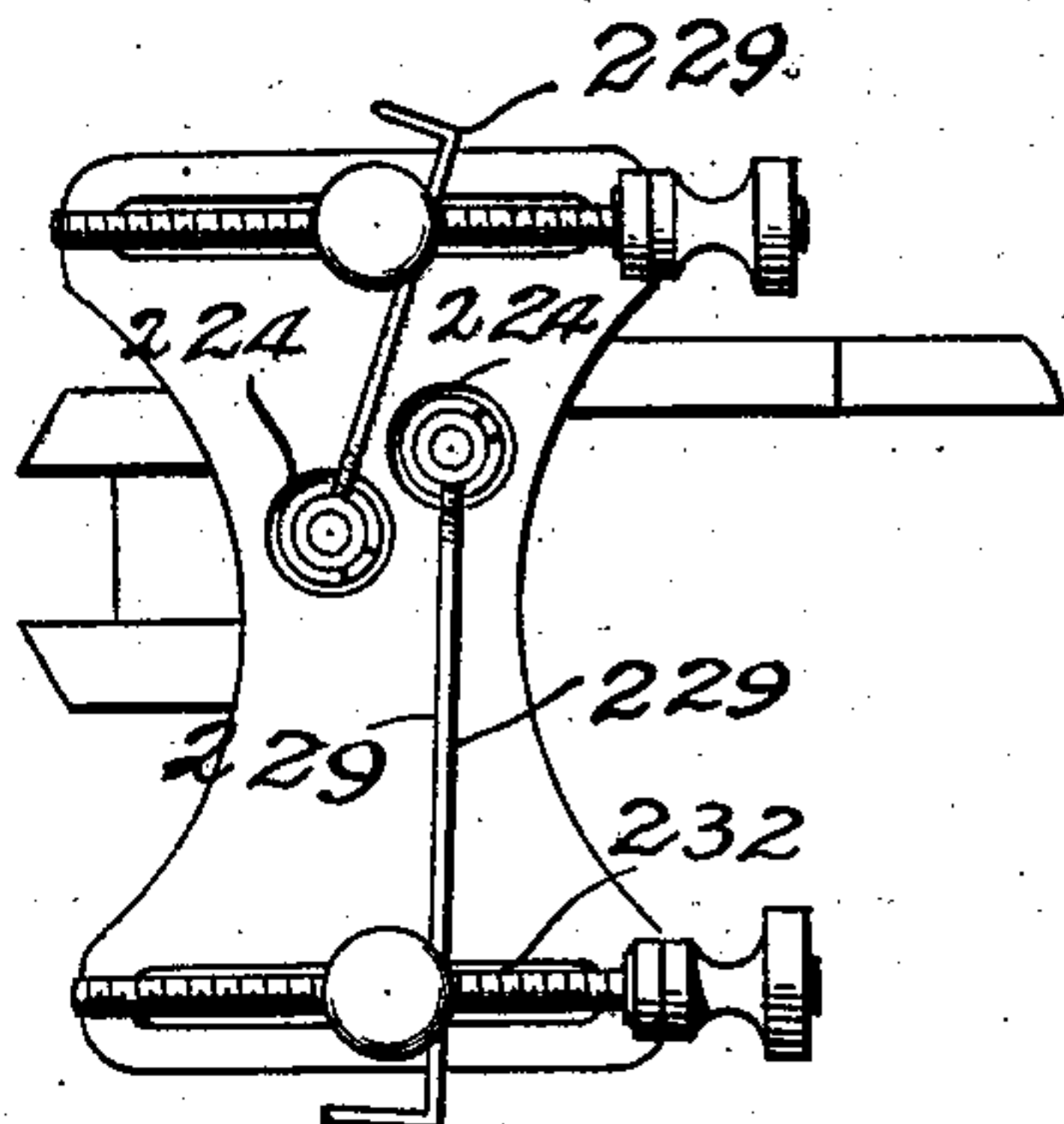


Fig. 30.

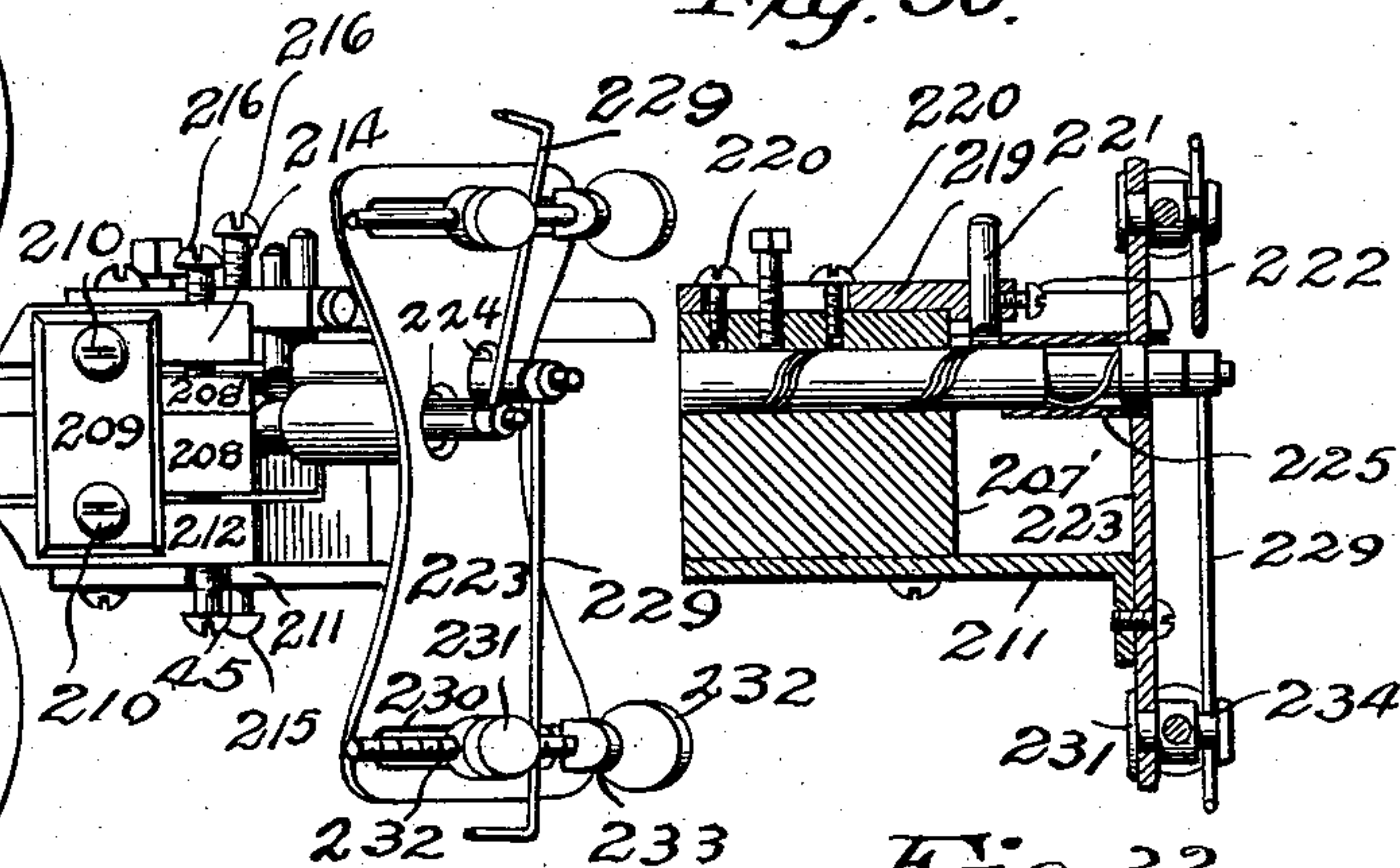
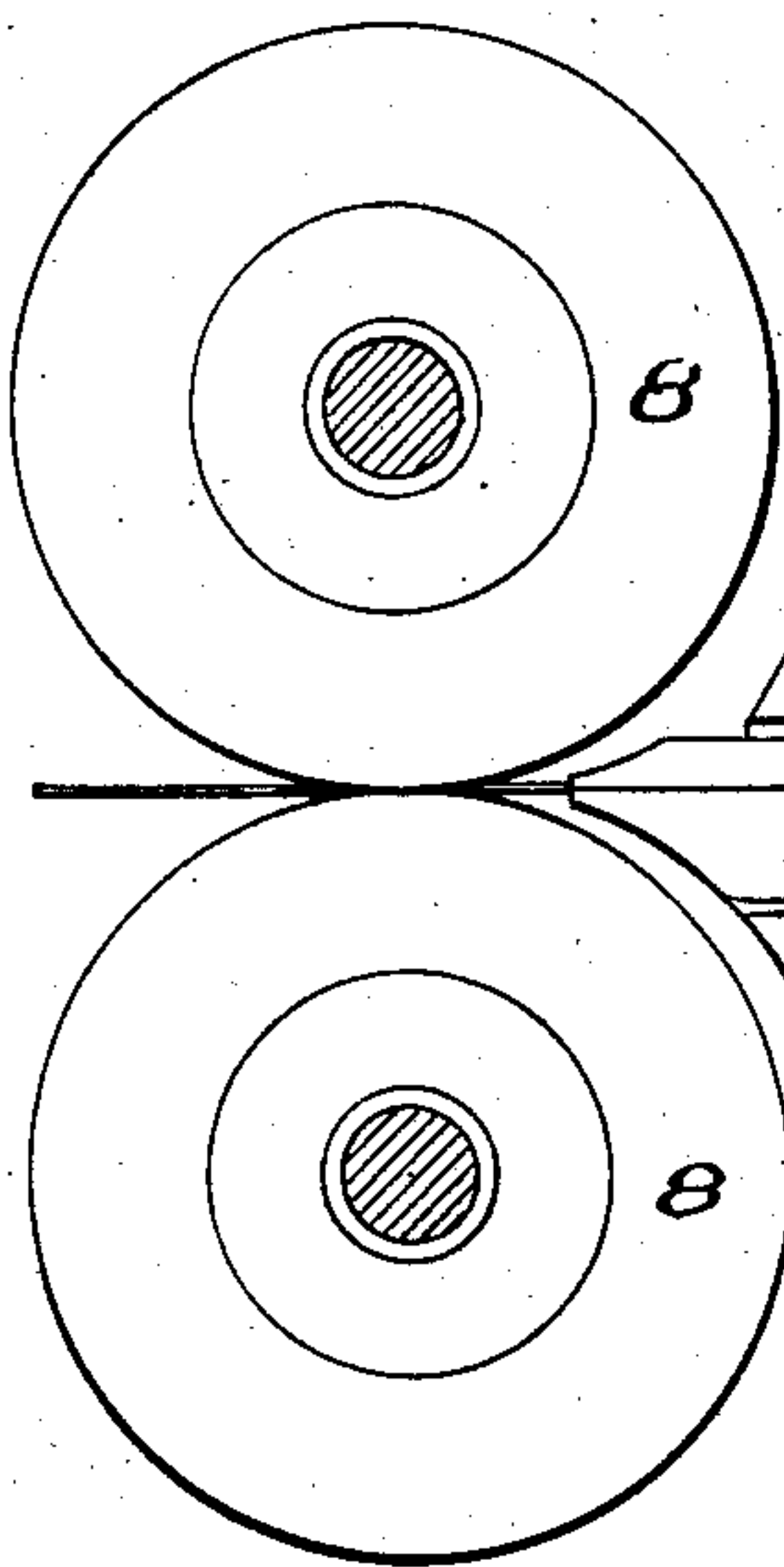


Fig. 31.

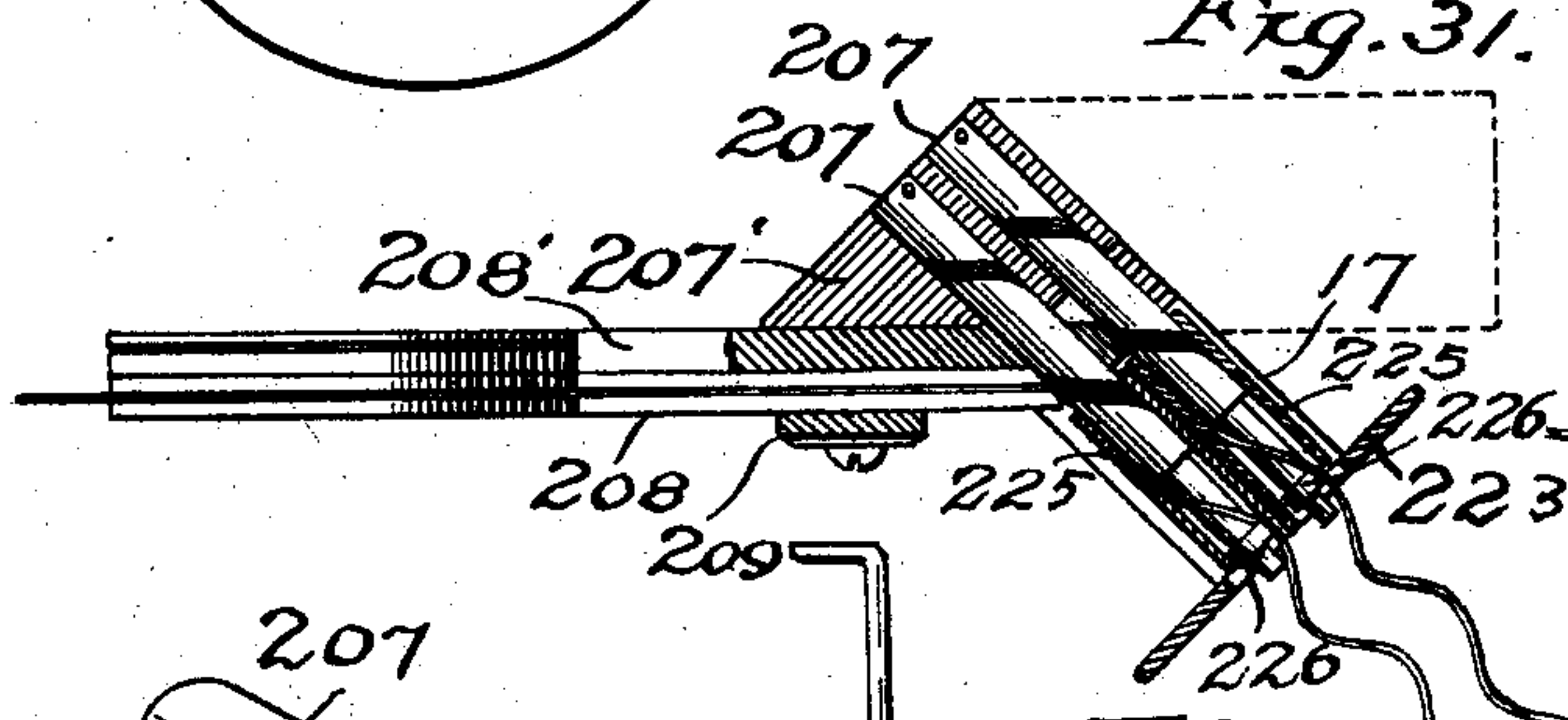


Fig. 33.

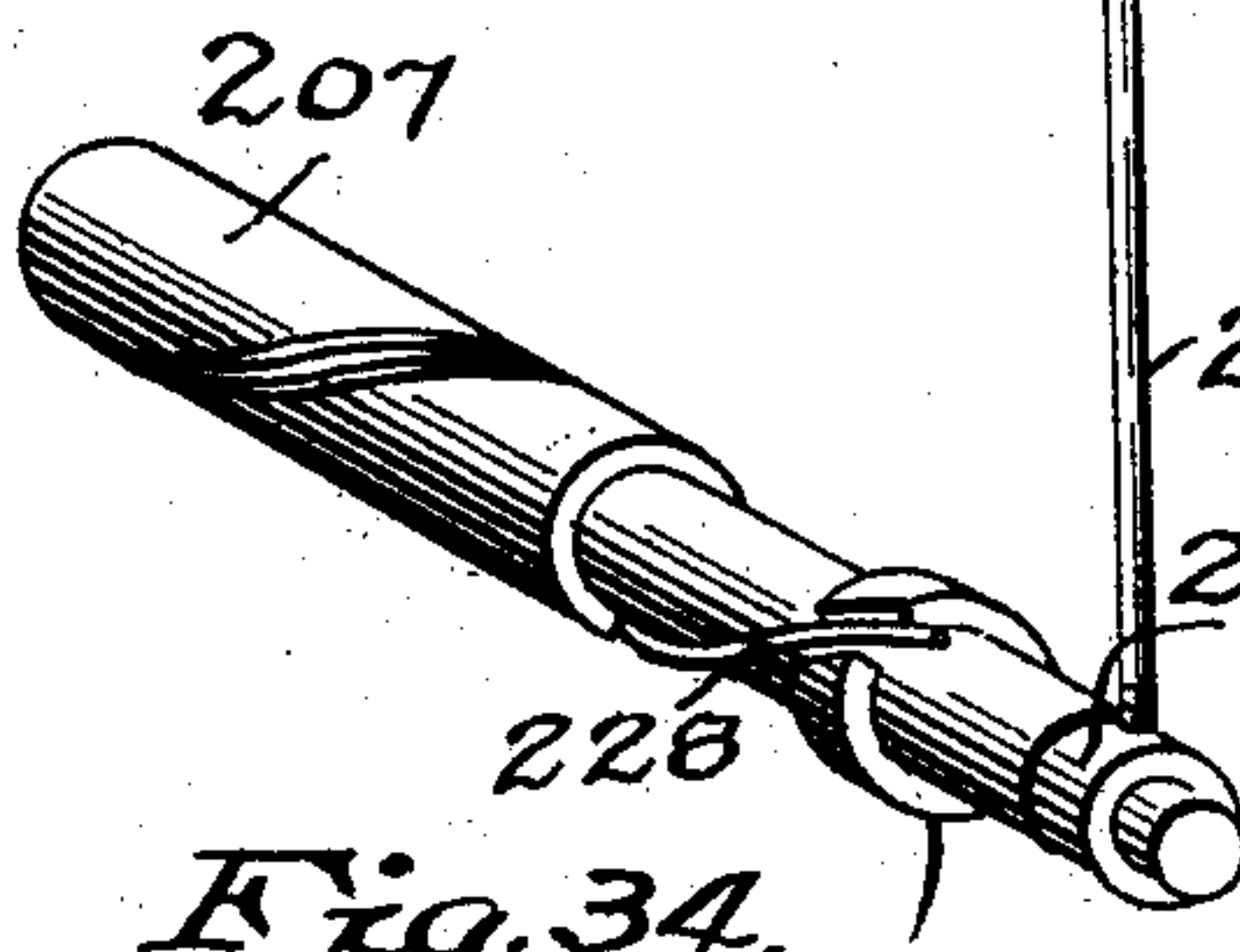


Fig. 34.

Witnesses:
C. E. Van Dorn
M. E. Gooley.

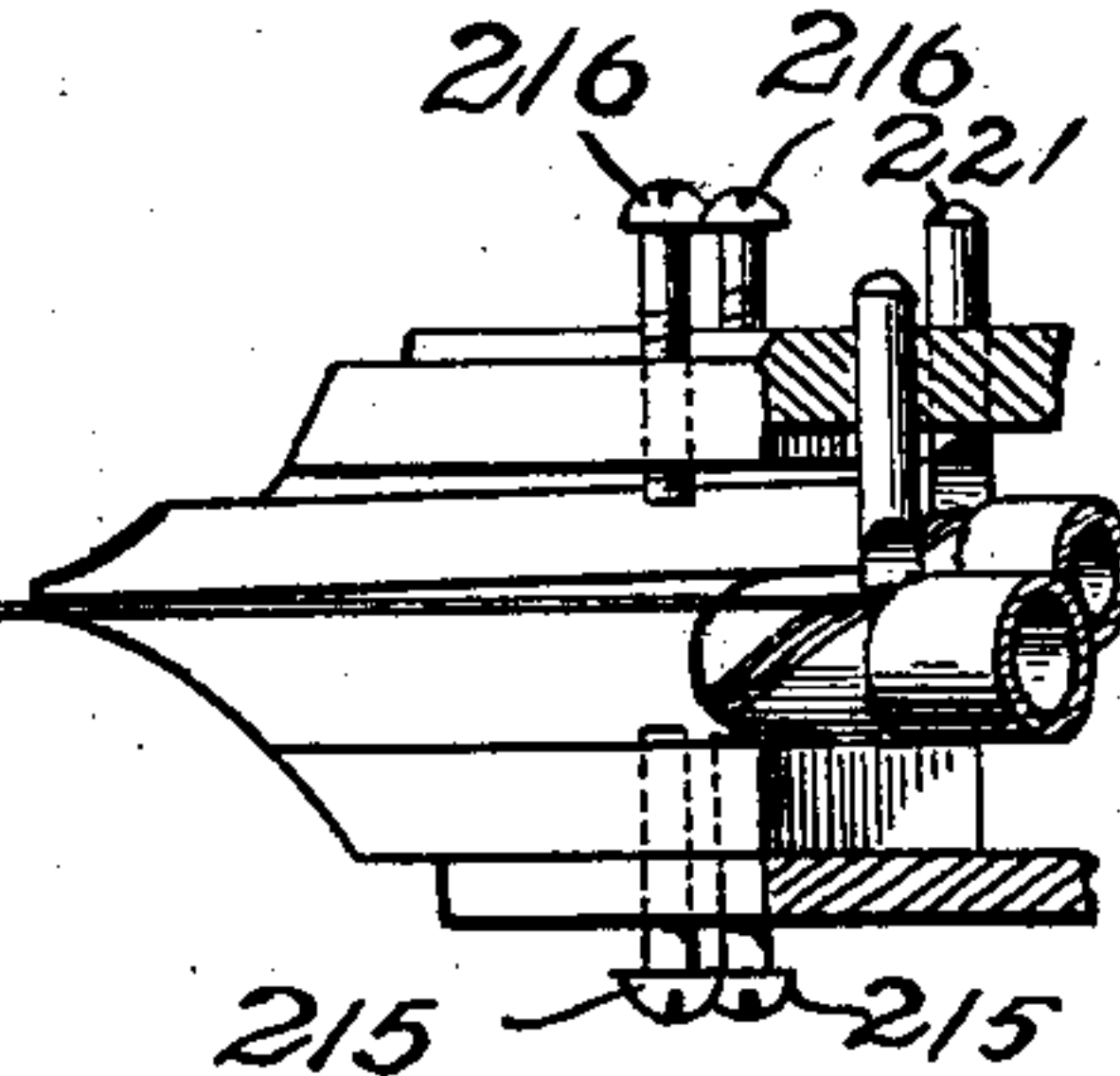
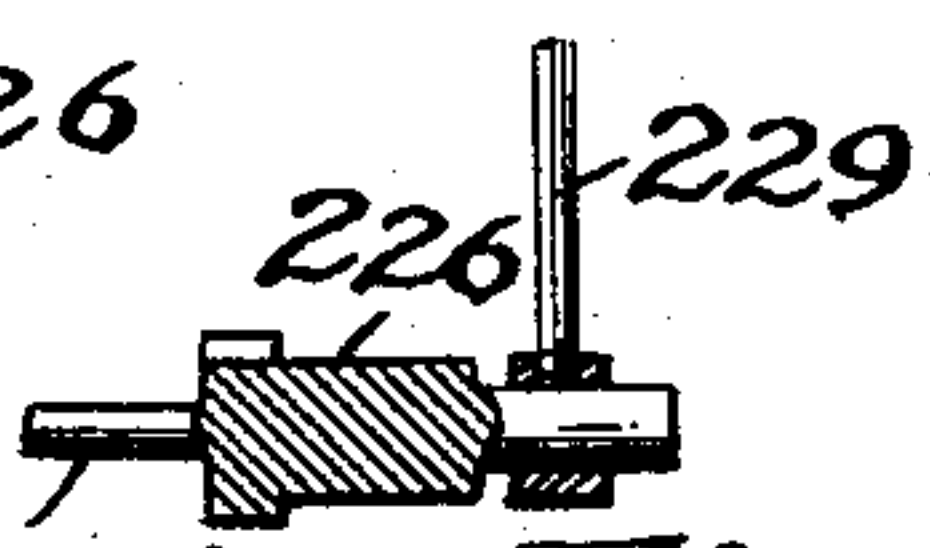


Fig. 36.



Ex. 35.
Invent

Clarence O. White
Marshall B. Lloyd.
By Paul Stanley
their Attorneys.

UNITED STATES PATENT OFFICE.

CLARENCE O. WHITE AND MARSHALL B. LLOYD, OF MINNEAPOLIS, MINNESOTA, ASSIGNORS TO THE WOVEN WIRE MACHINERY COMPANY, OF SAME PLACE.

APPARATUS FOR WEAVING COILED-WIRE FABRIC.

SPECIFICATION forming part of Letters Patent No. 605,831, dated June 14, 1898.

Application filed April 14, 1897. Serial No. 632,126. (No model.)

To all whom it may concern:

Be it known that we, CLARENCE O. WHITE and MARSHALL B. LLOYD, of Minneapolis, Hennepin county, State of Minnesota, have
5 invented certain new and useful Improvements in Apparatus for Weaving Coiled-Wire Fabric, of which the following is a specification.

This invention relates to improvements in
10 apparatus or machinery designed for weaving coiled-wire fabric for bed-bottoms or other purposes; and the objects we have in view are to provide a machine that will automatically weave a fabric of this kind, preferably of two independent wires which are similarly coiled and simultaneously interlocked
15 with the preceding wires, forming a fabric of any desired length and width.

Another object of the invention is to provide a machine that will automatically at any
20 desired intervals run in extra wires to any desired number, thereby forming independent ribs, which ribs will be arranged at any desired intervals in the bed-bottoms and also
25 at each edge thereof.

Another object of the invention is to provide means for evening up, trimming, and flattening the ends of the fabric, thereby putting the fabric in condition for putting on a
30 bed-frame and also preventing the wires from moving longitudinally while the fabric is being handled.

Other objects will appear from the following detailed description.

35 This machine in its general mode of operation is similar to that shown and described in Letters Patent issued to us on October 20, 1891, No. 461,695.

In the accompanying drawings, forming
40 part of this specification, Figure 1 is a plan view of a machine embodying our invention. Fig. 2 is a side elevation of the same. Fig. 3 is an elevation and partial section showing the feed-rolls and the means for automatically stopping the machine when the wires do
45 not pass properly from the feed-rolls into the fabric. Fig. 4 is a perspective view of the mechanism employed for connecting or disconnecting the driving mechanism from the

mechanism that controls the movement of the
50 fabric. Fig. 5 is a side elevation showing the means employed for separating the rolls, cutting the wire, and moving the ends of the wires when other wires are to be run into the fabric at the same point as preceding wires
55 for the purpose of forming a rib therein. Figs. 6 and 7 are respectively an elevation and a section showing the means employed for separating the feed-rolls after the running of each wire or set of wires. Fig. 8 is a trans-
60 verse vertical section showing the receiver into which the wires are run and showing also the means for operating the pins and holding-bar that are used in connection with said receiver. Fig. 9 is also a transverse section
65 through the receiver, showing the roll over which the fabric passes and the wires that are connected to the upright pins about which the fabric is formed. Fig. 10 is a side
70 elevation of a portion of the machine, showing the fabric passing therefrom and showing the means for evening up the ends of the fabric and for crushing and cutting the ends of the fabric. Figs. 11 and 12 are details showing
75 the spring-wires that are employed for holding up the fabric while it is being evened up at the ends. Fig. 13 is a partial end elevation of the machine, showing the construction employed for permitting the pins that
80 extend transversely through the fabric to be withdrawn by hand. Fig. 14 is a partial section and end elevation showing the means for intermitting the feed of the fabric when the additional wires are to be inserted. Fig. 15
85 is a partial side elevation of the mechanism shown in Fig. 14. Figs. 16 and 17 are details showing the means for longitudinally adjusting the receiver into which the coiled wires are run. Fig. 18 is a detail of the means for
90 cutting the wire and showing also the position and arrangement of the device for automatically stopping the machine should the wire double up between the coiler and the receiver. Fig. 19 is also a detail of the wire-cutting mechanism. Fig. 20 is a detail showing
95 the knife for cutting the wire and also showing the construction of the device we employ for moving the end of the coil in the re-

ceiver when a second set of wires is to be run in by the side of the first set for the purpose of forming a rib in the fabric. Fig. 21 is an end elevation, and Fig. 22 a side elevation, of the wire-moving device shown in Fig. 20. Fig. 23 is a perspective view of the roll that is located in the end of the receiver. Figs. 24 and 25 are details of the means for evening the fabric and crushing and trimming the edges thereof. Figs. 26, 27, 28, 29, and 37 are details of a modified form of automatic stop arranged between the reels and the coiler. Figs. 30, 31, 32, 33, 34, 35, and 36 are details of the coiler.

In the drawings, 2 represents the frame of the machine, which may be of any suitable size and construction. Arranged at one end thereof are the standards 3, in which are mounted in suitable bearings 5 the shafts 7 of the feed-rolls 8. One of the shafts 7 is provided with suitable fast and loose pulleys 9 and 10, to which, by means of a suitable belt, power may be applied to the machine. The lower shaft 7 is provided with a pinion 11, (see Fig. 3,) meshing with a similar pinion 12 upon the upper shaft 7, so that the two shafts are driven simultaneously and at the same rate of speed. We prefer to use feed-rolls 8, Fig. 3, formed of independent sections, mounted upon rubber or elastic or yielding cores or centers, whereby the rolls will accommodate themselves to inequalities in the diameter of the wire. These rolls are preferably secured upon the shaft 7 by suitable means, such as the collars 13 and nuts 14. We do not in this application claim the feed-rolls having the yielding cores or centers, as we have claimed the same in a separate application for patent filed April 14, 1897, Serial No. 632,127.

The bearings 5 for the upper shaft are capable of a slight upward movement, being held in position by a spiral spring 15, (see Fig. 6,) arranged between each bearing and the cap 16 of the standard 3. A short shaft 17 (see Fig. 7) is arranged in a bearing 18 at one side of the front standard 3, and the end of the shaft 17 projects beneath the box or bearing 5 for the forward end of the upper shaft 7. The shaft 17 is provided with a cam projection, (shown by dotted lines in Fig. 6,) so that by rocking the shaft 17 the upper feed-roll is slightly raised, thereby relieving the pressure from the wire and stopping its movement. Secured to the shaft 17 (see Fig. 5) is an arm 19, having a roll 20 secured to the end thereof, and this roll rests upon the curved surface of a block 21, that is adjustably secured upon a longitudinally-reciprocating rod 22. The rod 22 passes through a standard 23 and also passes over the recessed top of a standard 24 and is connected at its forward end to an upright pivoted arm 25. Said arm is provided at its upper end with a roll 26, mounted upon a suitable stud, and said roll engages a grooved cam 27, that is mounted loosely upon the cross-shaft 28. The cam 27 has secured to it a plate 27', and said

plate is engaged by projections 111 on the chain 103 hereinafter described. A pivoted arm 26' carries a roll 28', that engages recesses in the outer surface of the cam 27. Said lever has connected to it a spring 29', and by this means the cam is stopped in the proper position after each movement thereof. By this means the rod 22 is given a reciprocating movement, and thereby the wire-feeding rolls are intermittently separated while running at full speed for the purpose of stopping the wire after each coil is added to the fabric.

A suitable belt-shifter 23 (see Figs. 1 and 3) is arranged in connection with the driving-belt of the machine, this belt-shifter consisting, preferably, of a bar mounted upon the swinging arms 24, that are secured upon the standard 3. The belt-shifter is provided with a loop 25, through which the belt passes and by which it is moved from the fast to the loose pulley when it is desired to stop the machine. A lever 26'' is pivoted upon the frame of the machine and engages the bar 23. (See Fig. 3.) To the lower end of the lever 26'' is connected the spiral spring 27''', having its opposite end connected to the frame of the machine. A lever 28'' is pivoted to the frame of the machine, and a link 29 is connected to this lever and to the lower end of the lever 26''. A latch 30 is arranged beneath the frame of the machine in the position to engage the end of the lever 28'' when said lever is raised into a horizontal position. When the lever 28'' is raised into this position, as shown in Fig. 3, the belt is in engagement with the fixed pulley and the machine is driven. A lever 31 is pivoted upon a suitable support upon the frame of the machine, and its lower end engages said latch 30. (See Fig. 3.) The upper end of the lever projects a short distance above the frame of the machine, as shown in Fig. 3. A plate 32, secured to a rod 33, is arranged in front of the coiler and between said coiler and the end of the receiver. The lower end of the rod 33 is secured by a suitable pivot in front of the upper end of the lever 31. When the machine is running, this rod 33 and the plate 32 carried thereby stand in an upright position, as shown in Fig. 3. If the wire doubles between the coiler and the receiver, it will engage the plate 32 and move it back, so that it will drop over in the position shown in dotted lines in Fig. 3, striking the upper end of the lever 31 and moving said lever into the position shown by dotted lines in said figure. This will release the lever 28'' from the catch 30 and permit the spring 27''', through the lever 26'', to move the driving-belt onto the loose pulley, and thereby stop the machine. From the feed-rolls 8 the wires pass through the coiler, which is located directly in front of said feed-rolls. We prefer to employ a coiler that is double and coil two wires simultaneously but independently, as hereinafter described. After the wires leave the coiler they enter the receiver 34. (See Fig.

18.) This receiver is provided with a rectangular recess in its upper surface, as shown in Figs. 8 and 9, and one wall of the recess preferably extends higher than the other. A series of vertical pins 35 are arranged in the receiver 34, and said receiver, except a short stationary section 34' at the forward end, (see Fig. 18,) rests upon the uprights 36, that are secured to stationary arms 37, through which the shaft 43 reciprocates and which forms guides for said shaft. (See Figs. 18 and 19.) The shaft 43 is reciprocated longitudinally by means hereinafter described, and said shaft is connected to said receiver, and thereby the receiver is given a reciprocating movement. A bar 39, having a beveled edge 40, (see Figs. 8 and 9,) rests upon the top of one wall of the receiver and is connected by rods 41 and arms 42 to the rock-shaft 43. To the rock-shaft 43 is also connected an arm 44, and to the end of this arm is pivoted the rod 45, having the slot 46, through which passes a shaft 47, carrying a cam 48, and the rod 45 is provided upon its upper end with a roll 49, which rests upon the edge of said cam. (See Fig. 8.) The cam 48 is provided with the two projections 50, which insure the stopping of the roll 49 at the right place. The rod 45 is also provided at its lower end with the lug 51, which moves up and down in a hole in the bed-plate of the machine, thus insuring the movement of the rod 45 in a vertical line. A spring 52 is connected to the arm 44 and serves to draw down said arm and hold the roll 49 on the rod 45 in contact with the surface of the cam 48, and thereby to cause the bar 39 to be moved back when the cut-away portions of the cam come opposite the roll 49. When the bar 39 is moved forward, the beveled edge partially projects over the open top of the receiver and projects into the space between the last coil of the fabric and the next to the last coil, (see Fig. 9,) and, pressing upon the top of the last coil, which will be within the receiver, holds it firmly in position while the next succeeding wire or wires are running into position. Arranged upon opposite sides of the receiver are the bars 52, each provided with guide-pins 53, which extend through the lower part of the receiver 34. (See Figs. 8 and 9.) One of these bars is provided with a series of pins 55, which project horizontally through the longer or higher wall of the receiver 34 and engage the coils of the fabric. The other bar is provided with a similar set of pins 55, which extend through the bar 39, also in position to engage the fabric. The pins 55 also serve as guides for the bar 39. Rock-shafts 56 and 57 are arranged below the bars 52 and are provided with arms 58, having forks at their upper ends to engage said bars 52 (see Figs. 8 and 9) and permit said bars to move longitudinally with the receiver. The shaft 56 is provided with an upright arm 59, and the shaft 57 with a similar arm 60. (See Fig. 13.) A link 61 is pivoted to the end of the arm 59 and is provided at its opposite end

with a T-shaped slot 62, that is engaged by a pin 63 upon the arm 60. The narrow part of the slot is uppermost, as shown in Fig. 13, and the link is held by gravity, so that this part of the slot is in engagement with the pin 63. This causes the two shafts 56 and 57 to rock in unison and causes one set of the pins 55 to be advanced into the fabric as the other set is withdrawn, and the distance between the ends of the pins is sufficient to permit the fabric to move a distance equal to the diameter of a coil at each movement of the pins. When it is desired to separate the bars 52 for any purpose, the link 61 is raised, so as to bring the pin 63 opposite the long part of the slot 62, when the shaft 57 may be rocked independently of the shaft 56. A set-screw 64 is preferably provided in the link 61, projecting into the end of the slot 62 for the purpose of limiting this independent movement of the shaft 57 and the bar operated thereby.

For the purpose of rocking the shafts 56 and 57 we provide upon the shaft 56 an arm 65, which is provided at its end with an upright 66, carrying rolls 67 and 68, which engage a cam 69, located upon the shaft 47. By this means the two bars 52 are alternately moved back and forth toward the receiver 34, causing the pins 55 to act as an escapement to permit a step-by-step movement of the fabric.

Mounted in standards 70 in the frame of the machine is the fabric-feeding roll 71, preferably provided with ribs or projections 72 upon its surface, which are employed for positively feeding the fabric by the roll. One of the standards 70 is preferably located at some distance from the end of the roll, the roll being divided for this purpose, as shown in Fig. 1, so as not to have any projecting end or bearing for the roll at its end, which might interfere with the free movement of the fabric. At its opposite end this roll is provided with a ratchet-wheel 73, and an arm 74, pivoted upon the shaft of the roll, carries a pawl 75, that engages with the teeth of this ratchet-wheel. (See Fig. 13.) The opposite end of the arm 74 is pivoted to a rod 76, which extends across the machine and is provided with the slotted end, through which passes the shaft 47. The end of the rod 76 is provided with a roll 77, that is engaged by a cam 78 upon the shaft 47. An arm 79, connected to the arm 74, has connected to it a spring 80, the opposite end of the spring being connected to the frame of the machine. A rubber block or cushion 79' is arranged below the arm 79 in a recess or pocket 79''. The arm 79 forms means for operating the feed-roll by hand. By throwing up said arm or the pawl 75 the roll may be turned backward by hand should it be necessary to move the fabric backward for any purpose.

By means of the rod 76, the pawl 75, and the operating-cam the roll 71 is rotated with a step-by-step movement, causing the fabric

to be evenly moved from the receiver as far as the pins will allow, and after passing over the roll the fabric hangs by gravity by the side of the machine.

5 We will now proceed to describe the means by which power is imparted to the mechanism that moves the receiver, the transverse pins, and the large roll over which the fabric passes.

10 Arranged upon one of the shafts 7 of the wire-feeding rolls is a beveled pinion 90, that engages with a beveled gear 91, mounted loosely upon a short counter-shaft 92. (See Figs. 1 and 4.) The gear 91 has secured to it a pinion 93, and an idler-pinion 94 is mounted upon a swinging arm 95, provided with a handle 96. The pinion 94 is at all times in engagement with the pinion 93. Secured upon one bearing 97 of the shaft 92 are the two
20 stops 98 and 99, which limit the movement of the arm 95.

The shaft 28, hereinbefore referred to, is mounted in bearings 100 upon the frame of the machine, and said shaft is provided with
25 a gear-wheel 101, with which the idler 94 engages when the arm 95 is in the position shown by full lines in Figs. 1 and 4. When this arm is in the position shown by dotted lines in Fig. 4, said idler does not engage the gear
30 101. The idler may be changed for one of larger or smaller diameter, as may be desired, to arrange the machine for running the different lengths of fabric. The shaft 28 is provided with a sprocket-wheel 101', and a sprocket-chain 103 extends around this wheel and around the wheel 105, loosely mounted upon a shaft 106, that is supported in bearings 107 near the outer end of the machine. A sleeve 108 is arranged upon the shaft 106 and is free
40 to move longitudinally thereon, but rotates with said shaft. Secured to the end of the sleeve is a disk 109, provided with arms 110, which extend outwardly substantially even with the ends of the teeth upon the wheel
45 105. This disk is located close to the side of the wheel 105, and the chain 103 is provided at suitable intervals with projections or lugs 111, adapted to engage the end of the arm 110, so that as each one of these lugs on the
50 chain 103 engages one of the arms 110 the said shaft 106 is given a half-revolution.

The shaft 106 carries the beveled pinion 112, which meshes with a similar pinion 113 upon the shaft 47. (See Figs. 2, 14, 16, and
55 17.) By this means the shaft 47 and the mechanisms hereinbefore described connected with said shaft are driven at the desired intervals of time. The projections 111 are preferably adjustable upon the chain 103, so
60 that the intervals between the movements of the shaft 106 may be varied at will. The shaft 106 is provided at its end with a crank 114, (see Figs. 1 and 16,) and this crank is connected by a link 115 with the upper end of a
65 pivoted lever 116, the lower end of the lever being pivoted to the frame of the machine. A connecting-rod 117 is pivoted to the lever

116, and its opposite end is connected to a collar 117', that is arranged upon the shaft 43. (See Fig. 16.) The collar 117' is preferably arranged between the two collars 118, that are connected to the shaft 43 by set-screws 119 or other suitable means. The receiver 34 being connected to the shaft 43 by means of the arm 37 at each rotation of the shaft 116 said receiver, together with said shaft, will be moved forward and back, the distance that said receiver is moved in each direction being equal to one-half of the length of one coil or turn of the coiler-wire.
70 80

The cam 27, from which the rod 22, that moves the devices for separating the rolls, cutting the wire, and moving the end of the wire in the receiver, is operated, has connected to it a cross bar or plate 27'. (See dotted lines, Fig. 1.) The cam is mounted loosely on the shaft 28, and as the chain passes over said cam the projecting ends of the bar 27' are engaged by the projections 138 on the chain, and as each projection passes said bar 27' the cam is given a half-rotation, thereby moving the arm 25, the rod 22, and the devices connected to said rod. The cam 27 is preferably provided with the oppositely-placed recesses 27''. An arm 26' is preferably pivoted upon the frame of the machine and is provided with a roller 28', and a spring 29' engages said lever or arm and draws it inward, so as to bring said roller against the circumference of the cam. When the cam reaches the desired position, the roller is driven into the corresponding recess in the cam, and thus insures a stoppage of the cam at the proper intervals.
90 95 100

It will be understood that when additional wires are to be run into the fabric by the side of wires already in place, so as to form a rib or selvage, the fabric will not be moved in the intervals between the running of the two sets of wire. It is therefore necessary when it is desired to insert such wires to intermit the movement of the receiver and the feeding of the fabric. For this purpose the sleeve 108 (see Fig. 14) is arranged to be capable of moving longitudinally upon the shaft 106, and it is provided in its circumference with a groove extending around it, in which are placed the blocks 120. (See Fig. 17.) Said blocks are connected to a yoke 121, that surrounds said sleeve, said yoke being secured to or formed upon the upper end of a lever 122. (See Fig. 14.) The lower end of said lever is secured upon a short shaft 123, mounted in suitable stationary bearings upon the frame of the machine. To this shaft is also connected the arm 124, and a spring 125 is connected to said arm and to the frame of the machine. The arm 124 is provided at its end with a crank 126, carrying a roll 127. (See Figs. 14 and 15.) Upon the shaft 106 is arranged the small sprocket-pinion 128. A sprocket-wheel 129 is mounted upon a stud upon a post or projection 130 upon the frame of the machine, and eccentrically pivoted upon the face of the wheel 129 is the hook-dog 131.
105 110 115 120 125 130

(See Fig. 15.) This dog has a hook 132 at one end, and its rear end is made of greater weight, so as to cause the hook end to be thrown upward to cause it to engage the sprocket-chain 133 for a purpose hereinafter described. The sprocket-chain 133 passes around the idler 134, mounted in a stud upon the frame of the machine, and in order to use as long a chain as possible and to cause the chain to assume the desired position we carry the chain through an opening in the base-plate of the machine and carry it around an idler 135, preferably mounted upon a stud upon one of the legs of the machine. The chain also passes over the idler 136, mounted upon a standard or projection 137 upon the bed-plate of the machine and located directly under the roll 127. The other part of the chain passes over a smooth roll 137, preferably arranged beneath the dog 131. We provide the chain 133 with the adjustable lugs or projections 138, one of said lugs being arranged to be connected to any one of the links in the chain. Then as the sprocket 129 is rotated from the sprocket 128 by means of the connecting sprocket-chain 139 the hook end of the dog 131 will successively engage the links of the chain 133, causing said chain to move over the idlers upon which it is mounted. When one of the projections 138 is brought beneath the roll 127, the shaft 123 will be rocked and the sleeve 108 will be moved, carrying the arms 110 out of the path of the projections 111 upon the chain 103. When this is done, one of the lugs 111 upon the chain 103 will pass the arms 110 without moving the shaft 106, and consequently at this time the receiver, the bar having the beveled edge, the transverse pins, and the roll over which the fabric passes will all remain stationary. By a suitable arrangement and number of the projections 138 upon the sprocket-chain 133 any desired number of wires may be woven into the fabric at any desired intervals.

A belt-tightener is preferably arranged in connection with the chain 103, said tightener consisting of a pivoted arm 140, having mounted thereon the idler-sprockets 141, which are arranged to engage the upper and lower surfaces of one part of said chain, as shown in Fig. 2.

Arranged in the stationary part 34' of the receiver or at the end at which the wire enters is preferably a roll 142, mounted upon a pin 143, that is secured to a projection 144 upon the wall of the receiver, (see Figs. 18, 19, 20, and 21,) and formed upon or secured to said projection 144 is a rear projection 145, that fits against the side wall of the receiver. A spiral passage 145' is formed in the projections 144 and 145, the end of said passage being on a level with the top of the receiver at this point. A knife 146 is pivoted upon the end of the receiver near the end of said passage by means of the pivot-pin 147, and the opposite end of said knife is provided with a

slot that is engaged by a pin 148 upon the reciprocating rod 122. When said rod moves forward and stops the feed of the wire, said knife is turned upon its pivot, and the edge of the knife passes over the end of said passage and severs the wire. The movement of said knife is so timed that after it has moved forward to cut said wire and has covered the end of said passage 145' it remains in this position until just before the wire is fed forward again by the feed-rolls. By keeping the end of the passage covered the ends of the wires forming the last coil are prevented from moving back and projecting into the end of said passage, when they are moved in the receiver without the fabric being fed forward, as hereinafter described.

For the purpose of moving the ends of the wires in the receiver so as to permit other wires to be run alongside of them we provide a short shaft 149, mounted in bearings upon the frame of the machine and having secured thereto a collar 150, having a projection 151, arranged to be engaged by a projection 152 upon an arm 153, that is secured to the reciprocating rod 22 by a set-screw 154. (See Fig. 5.) The opposite end of the shaft 149 extends beneath the end of the receiver and has secured to it the plate 155, which, as here shown, is in the form of a sector of a circle. Pivoted upon this plate eccentrically to the shaft 149 is a finger 156, having a projecting lower end 157, that rests against the pin 159' on the plate 155. A spring 158" is connected to the end 157 and to the frame of the machine. This finger is arranged to project through a slot 158 in the bottom of the receiver, so that as the shaft 149 is given a partial rotary movement said finger is projected through said slot and then engages the side of one of the coils, as indicated in Fig. 18, and gives the part of the wire that is near the end of the receiver a slight movement longitudinally in the receiver and toward the coiler sufficient to change the position of the ends of the wires that have just been severed by the knife, so that as the feed-rolls are brought together again the next wires will enter the receiver without coming in contact with the ends of the last preceding wires. It is at this time, when the wires are moved longitudinally in the receiver in the manner described, that the position of the knife over the end of the passage prevents the ends of wire from moving into the end of the passage 145'. This action, it will be understood, is only necessary when the fabric is not moved, and additional wires are to be woven into the fabric for the purpose of forming a rib or a selvage.

It has been customary in forming coiled wire fabric for bed-bottoms or other purposes to trim the edges of the fabric after it is made, and it is customary to flatten the edges of the fabric by hand, so as to fit it for being secured to the frame of the bed-bottom. It has generally been necessary heretofore to trim both

edges of the fabric, and from this considerable waste of wire necessarily results. We provide in this machine automatic means for evening up the fabric after it is formed by causing the wires to be moved so that they are all even at one edge of the fabric, and as the wires forming the fabric will be very nearly of the same length it follows that the fabric need be trimmed only at one edge and then only a very little. For this purpose we provide a series of wires 160, that are connected to the ends of the pins 35, arranged in the receiver 34. (See Figs. 8, 9, and 10.) These wires extend over the roll 71 and then hang down loosely nearly to the bottom of the machine. As the coils are formed around the pins 35 it follows that as the fabric is fed off from the pins 35 it passes onto the wires 160, or, in other words, that said wires are within the coils of the fabric. At the lower ends of the wires 160 are spring-wire loops 161, which are of slightly-larger diameter than the spaces between the coils, so that said loops must be somewhat compressed as the fabric passes over it. (See Figs. 10 and 11.) It results from this that the wires forming the fabric are crowded together in that part of the fabric that is passing over said loops 161, as indicated in Fig. 10, and there will be a little slack in the fabric above said loops 161. This permits giving to these slack wires a slight longitudinal movement, so as to even them all up at one end. To do this, we provide the pivoted plate 162, having the flange 163, that extends close to the ends of the wires at the point referred to. (See Figs. 10, 24, and 25.) A rod 165 is pivotally connected to the plate 163 and extends through a bearing 166, that is supported upon one of the longitudinal rods 167, that connect the legs at the opposite ends of the machine. A spring 168 is arranged between said bearing 166 and an adjustable collar 169, secured upon the rod 165. The rod 165 is also provided with a collar 170, secured in position by means of a nut 171. A shaft 172 is mounted in bearings upon the frame of the machine, and one of said bearings may be formed integrally with said bearing 166, and said shaft is driven by means of a chain 173, extending from a sprocket-wheel 174 on said shaft 172. Upon this shaft is a wheel with a series of ratchet-teeth 175. As the shaft is rotated the long sides of the ratchet-teeth engage the projection 170 and draw back the rod 165 and plate 162 until the tooth passes said projection when the spring 168, which has been compressed in this operation, rebounds, causing the flange 163 on the plate 162 to strike a quick blow upon the ends of the wires in the slack part of the fabric referred to. This will even up the wires at this end of the fabric and causes all of the unevenness to be at the other end of the fabric. Immediately after this operation the ends of the fabric pass between the stationary jaws 176 and the movable jaws 177, said movable jaws being operated by means of the

toggle-levers 179 and the adjustable rod 180, connecting said toggle-levers and the connecting-rod 181, that extends to a crank on the shaft 172. (See Fig. 24.) One of said movable jaws is preferably provided with a knife 182, adapted to cut by the opposing stationary jaw and trim the ends of the wires at that edge of the fabric. As the edges of the fabric pass between said jaws the coils at the ends of the wires or edges of the fabric are flattened or crushed, and this puts the fabric in shape for attachment to the frame of a bed-bottom. We prefer to provide a notched wheel 183, that is mounted on the frame of the machine in such position that the fabric passes down over it as it is being fed from the machine. This wheel is preferably located close to one of the wires 160, so that as the fabric is struck by the evening device the part of it above the stock-wires is held in position by this wheel and the wire 160, which is close to said wheel. This keeps the fabric from being moved out of position by the evening device.

We prefer to provide automatic means located between the feed-rolls and the coiler whereby when either of the wires on the reels becomes tangled or does not feed freely the machine will be automatically stopped. For this purpose we provide upon the under side of the bed-plate of the machine a pivoted rod 185, and this rod is connected to the latch 30, by which the lever 28" is held in position. We have shown two forms of device by which this lever may be operated. In the construction shown in Figs. 1 and 2 the rod 185 extends across the machine and is provided with the arm 186, that is adapted to engage the lever 31 (see Fig. 3) and thereby move the latch 30. The rod 185 is also provided with the arm 187, having a notch or recess 188 upon its under surface. (See Fig. 2.) A rod 189, pivoted at its lower end upon the sleeve 190, that is secured in the frame of the machine, carries at a point below the arm 187 the roll 191 and carries at its upper end a wheel 192, that is grooved to receive the running-wire. This rod is free to move in either direction, turning upon the pivot by which its lower end is supported. The rod 185 is also provided with the crank-arm 193, to which is connected the spring 194. The wire passes from the two reels 195 and through the grooved guides 196 and is then passed around the wheel 192. The lever 28" being set in position to bring the belt over the fast pulley, the rod 185 will be held in position by the roll 191, which will engage the recess 188 in the arm 187. As soon, however, as either of the wires becomes taut or does not feed freely from its reel the rod 189 will be drawn over toward the reel upon which the wire is caught. This will bring the roll 191 out of the notch or recess 188, permitting the rod 185 to turn sufficiently under the tension of the spring 194 for the arm 186 to operate the latch 30 and release the lever 28". In Figs. 26 to 29 we have shown

a modified construction for this purpose. As here shown, the rod 185 extends lengthwise of the machine under the bed-plate, and its arm 185 has secured to it a projection 185', that is adapted to engage the lever 31, that operates the latch 30. Secured to the front of the bed-plate are the two rods 197, extending, preferably, nearly the full length of the machine and supported in suitable bearings or supports 198. Two slides 198 are arranged upon the rods 197, and these slides are adapted to move freely upon said rods. Mounted upon each slide 198 is a grooved roll 199. Each of said slides 198 is provided with a notch or recess 200. An arm 201 is secured to the rod 185 and carries at its forward end a wheel 202. A crank-arm 203 is secured to the rod 185, and a spring 204 is connected to said crank-arm and to the frame of the machine. When the slides 198 are in the position shown in Fig. 29, the rolls 202 will be in engagement with the recesses 200 in the slides 198 and will be held in position by the springs 204. The wires from the reels pass through the guides 205 (see Fig. 29) and around the rolls 199 and then pass over a guide-wheel 206 and are led to the feed-rolls of the machine. Should either of the wires become taut or tangled or should anything else occur so that the wire did not feed freely from its reel, sufficient tension will be exerted upon the corresponding roll 199 to move the slide 198 along on the rods 197. This would free the wheel 202 from said slide, and the spring 204 would turn the rod 185, thereby operating the latch 30, dropping the lever 28'', and stopping the machine. We do not, however, limit ourselves to the details of construction of the device employed for stopping the machine when the wire becomes tightened.

In Figs. 30 to 36 we have shown the construction of coiler that we prefer to use for coiling the wire after it leaves the reels and before it enters the receiver. This coiler is located in front of the feed-rolls 8 and consists, essentially, of the two mandrels 207. (See Figs. 33 and 34.) These mandrels are mounted in a suitable support or standard 207', and each mandrel is provided with a spiral groove extending the full length thereof. These grooves may be of a width substantially equal to the diameter of the wire that is to be fed; but we prefer to form them of greater width and to arrange in the groove of each mandrel a series of spirally-coiled wires, one of the wires being cut off at the point where the running wire enters the groove. A spiral passage is thus formed for the running wires, the side walls of which are made up of similarly-coiled stationary wires, which may be removed and replaced when they become worn, and by this means wear of the mandrel is prevented. We have here shown three wires arranged in the groove, the center wire being cut out at the point where the running wire enters the groove. Between the feed-rolls and the said mandrels are the guide-

plates 208 and 208'. These plates are arranged one upon top of the other, one plate, preferably the lower one, being grooved for the passage of the wire. Two of these plates are provided for each wire. The plates are held in vertical alinement and are clamped against the wall of the standard by means of the plate 209, which is secured in position by suitable screws 210. The standard 207' is secured upon the base-plate 211, and the plates 208 and 208' are arranged between the projections 212 and 214 upon said standard. Screws 215 and 216 pass through said projections and engage said plate, (see Figs. 31 and 36,) and by means of said screws said plates may be vertically adjusted, so as to guide the wires properly into the spiral groove in said mandrel. The wires enter the said spiral groove at points directly in front of said standard 207', (see Figs. 32 and 36,) at which point the pins 221, having the beveled lower ends, are arranged so as to have said beveled lower ends pressed directly upon the top of the running wire as it enters said groove. Said pins are secured in the longitudinally-adjustable plate 219 by means of the set-screws 222. The plate 219 is held in position upon the top of the mandrel by means of the screws 220, which are passed through a slot in the top of said plate. At the forward end of the mandrel is the short section 226, provided with the dowel-pin 226' (see Fig. 35) and provided with a collar 227, having a groove or recess extending through it. The dowel-pin permits the section 226 to be rotatably adjustable about the axis of the mandrel, and the mandrel is of smaller diameter for a short distance in the rear of the collar 227, and one of the wires—that one against which the running wire bears while passing through the spiral groove—extends into the notch or recess formed on the collar 227, and the end of said wire is left free to bear against the shoulder formed by said notch in said collar. A sleeve or casing 225 surrounds the forward end of the mandrel, and a vertical plate 223 is provided with openings 224, through which the sections 226 of the mandrel project. Each of said sections is provided with a wire 229, which forms means by which said section may be rotated upon its axis. Said plate 223 is provided, preferably near the upper and lower ends, with a slot 230, in which is arranged a slide 231. An adjusting-screw 232 is mounted in the lug 233 and screws through said slide 231. The wire 229 is in contact with the groove 234 in the slide 231. The friction of the running wire against the shoulder 228 upon the rotatable section of the mandrel presses the wire 229 against the slide 231, and by adjusting the position of said slide the position of the shoulder 228 may be regulated, and thereby the twist of the coil may be increased or diminished. This coiler enables us to feed wires that differ considerably in hardness and flexibility owing to inequalities in the tempering process or to other causes. As the

wires pass through the independent coilers, wherein means is provided for independently regulating the pitch and length and diameter of the coils, we are able to make such adjustment as to cause the coiled wires to be of exactly the same length and pitch of coil.

Having thus described our invention, we claim as new and desire to secure by Letters Patent—

1. The combination, with a suitable coiler, of a receiver into which the coiled wire passes after it leaves the coiler, a series of pins or projections located in said receiver in the path of the advancing wire, and means for moving said receiver and said pins toward or from said coiler.

2. The combination, with a suitable coiler, of a receiver into which the coiled wire passes after it leaves said coiler, two series of transverse pins arranged to project into said receiver from the opposite sides thereof, means for moving said pins into and from said receiver, and means for giving said receiver a back-and-forth longitudinal movement and for moving said pins with said receiver.

3. The combination, with a coiler, of the longitudinally-movable guide or receiver 34, the vertical pins 35 arranged in said receiver, the oppositely-projecting transverse pins 55, and the plate 39 arranged to project over the opening of said receiver and provided with the beveled edge 40, and means for moving said receiver toward and from said coiler.

4. The combination, with the longitudinally-movable receiver 34 and the transverse pins 55, and means for alternately moving said pins, of means whereby either set of said pins may be moved independently of the other.

5. The combination, with the receiver, of the transverse pins, the rock-shafts for moving said pins, and means whereby either of said rock-shafts may be moved independently of the other.

6. The combination, with the receiver and the transverse pins 55, the rock-shafts 56 and 57 for moving said pins provided with the arms 59 and 60, and the link 61 connecting said arms and provided with the T-shaped slot 62, for the purpose set forth.

7. The combination, with the longitudinally-movable receiver, of the transverse pins 55, the bars 52 to which said pins are secured, and the rock-shafts provided with arms having forked ends engaging said bars 52, whereby said bars are permitted to move longitudinally with said receiver.

8. The combination, with a suitable coiler, of the receiver comprising the stationary section and the movable section arranged in line therewith.

9. The combination, with the coiler, of the stationary section 34', the movable section 34, and the roll 142 arranged in said stationary section.

10. The combination, with a suitable coiler, of the stationary section 34', the movable section 34 arranged in line therewith, the roll

142 arranged in said stationary section, and the projections 144 and 145 provided with the spiral passage 145'.

11. The combination, with the receiver, of the roll 142 arranged therein, the projections 144 and 145 provided with the spiral passage 145', and means for severing the wire after it passes through said spiral passage, for the purpose specified.

12. The combination, with the receiver having a spiral passage provided therein through which the wire must pass, of a knife arranged to move across the end of said passage for severing the wire, and means whereby said knife covers the end of said passage until just before the next wire moves through said spiral passage.

13. The combination, with the receiver, of the shaft 149, means for moving said shaft, the plate 155 arranged upon said shaft, the finger 156 pivotally supported upon said plate and provided with a weighted lower end, and the spring 158", for the purpose set forth.

14. The combination, with the coiler and the receiver, of the vertical plate 32 pivotally supported between said coiler and said receiver at one side of the path of the moving wire, and a stop mechanism arranged to be operated by the movement of said plate, for the purpose set forth.

15. The combination, with the coiler and receiver, of the vertical plate 32 pivotally supported upon the frame of the machine, the stop mechanism, the latch controlling said stop mechanism, the lever 31 connected to said latch and adapted to be operated by said plate 32, for the purpose set forth.

16. In a machine for weaving coiled-wire fabric, the combination, with the feed-rolls and means for driving said rolls, of means for cutting the wire, and means for imparting the necessary movement to the fabric, and mechanism for operating the wire-cutting and fabric-moving devices, and means for connecting or disconnecting said last-named mechanism with the means for driving the feed-rolls.

17. The combination, with the feed-rolls and coiler, and means for driving said feed-rolls, of the shaft 28 from which the wire-cutting and fabric-moving devices are operated, the shaft 92 arranged to be driven from the shaft of one of the feed-rolls and provided with the bevel-gear 91 and the pinion 93, said pinion and gear being loosely mounted on said shaft, the movable arm 95 carrying the pinion 94 arranged to engage said pinion 93 and to be thrown into or out of connection with the gear upon said shaft 28, whereby the wire-cutting and fabric-moving devices may be disconnected from or connected with the means for driving the feed-rolls.

18. The combination, with the feed-rolls and the shafts 7 upon which said rolls are mounted, one of said shafts being movable for the purpose of permitting said rolls to be separated, the short shaft 17 provided with a

projection engaging the bearing of said movable shaft and provided with the arm 19 carrying the roll 20, and the reciprocating rod 22 provided with the projection 21 arranged thereon, for the purpose specified.

19. The combination, with the feed-rolls, of means for separating said rolls, said means comprising a suitable cam, an operating-rod controlled by said cam, and a belt or chain provided with projections arranged to engage and move said cam at suitable intervals.

20. The combination, with means for separating the feed-rolls, of operating means therefor comprising a suitable cam, an endless chain or belt provided with suitable projections arranged to engage and move said cam at suitable intervals, and means for supporting and moving said belt.

21. The combination, with the rotatable cam 27 provided with the plate 27', the chain or belt having projections arranged to engage said plate 27', means for supporting and moving said chain or belt; and means controlled by said cam for separating the feed-rolls, cutting the wire, and moving the last coil of wire in the receiver, for the purpose set forth.

22. The combination, with the coiler and receiver, of means for alternately moving said receiver to or from said coiler, and means operating at desired intervals for intermitting the movements of said receiver, for the purpose set forth.

23. The combination, with the coiler and receiver, provided with the oppositely-projecting transverse pins, of means for moving said receiver toward or from said coiler, means for moving said pins into or from said receiver, and means operating at desired intervals for intermitting the movements of said receiver and said pins.

24. The combination, with the coiler and the receiver, of the transverse pins adapted to project from opposite sides into said receiver, a plate arranged upon said receiver and adapted to partially cover the open top thereof, means for longitudinally moving said receiver, means for moving said pins into or from said receiver, means for moving said plate, and means operating at desired intervals for intermitting the movements of said receiver, said pins and said plate.

25. The combination, with the longitudinally-removable receiver, of means for moving said receiver, comprising the shaft 106, a connection between said shaft and said receiver, the plate 110 secured upon said shaft, the loosely-mounted sprocket-wheel 105 arranged upon said shaft, and the chain or belt 103 provided with suitable projections 111 adapted to engage the plate 110 for the purpose of turning said shaft.

26. The combination, with the receiver, of means for moving said receiver, comprising a suitable shaft 106, the plate 110 secured upon said shaft, a sprocket-wheel mounted loosely upon said shaft, a chain or belt passing over said sprocket-wheel and provided

with projections arranged to engage the ends of said plate, and means for moving said plate at suitable intervals out of the path of the projections upon said chain or belt.

27. The combination, in a machine for weaving coiled-wire fabric, with means for feeding and severing the wire, of a receiver into which said wire passes and in which it is interlocked with the coils of the preceding wire, of connected mechanism for operating the wire feeding and severing devices and for moving said receiver in the intervals between the feeding of the wire, for the purpose set forth.

28. In a machine for weaving coiled-wire fabric, the combination with means for feeding, coiling, and severing the wire, of a receiver into which said wire passes and in which it is interlocked with the preceding coils, means for moving said receiver toward and from said coiling means in the intervals between the operation of the feeding and coiling mechanism, and means for intermitting the movement of said receiver.

29. The combination, with the receiver and the pins arranged therein, of the wires connected to said pins.

30. The combination, with the receiver and the pins arranged in said receiver, of the wires connected to said pins, and the spring-loops connected to said wires, for the purpose set forth.

31. The combination, with means for forming the fabric, of means for longitudinally moving the wires after the fabric is formed for the purpose of evening the ends of the fabric.

32. The combination, with means for forming the fabric, of means operating upon the ends of the wires for evening up the fabric, for the purpose set forth.

33. The combination, with means for forming the fabric, of means for evening the ends of the fabric, and means for trimming one or both ends of the wire, for the purpose set forth.

34. The combination, with means for forming the fabric, of means for evening the fabric, means for trimming one or both ends of the wires, and means for crushing the ends of the coils, for the purpose set forth.

35. The combination, with means for forming the fabric, of means for forming a slack in one portion of the fabric, and means for moving the wires in such slack portion of the fabric, for the purpose of evening the fabric.

36. The combination, with means for forming the fabric, of the movable evening-plate, and means for operating said plate.

37. The combination, with the wires and the spring-loops over which the fabric passes, of the movable evening-plate, and means for operating said plate.

38. The combination, with means for forming a slack in the fabric, of the movable evening-plate arranged to engage the ends of the wires in the slack portion of the fabric, and means for moving said plate.

39. The combination, with the wires and the spring-loops over which the fabric passes, of means for moving the wires for evening the fabric, and means for trimming the ends
5 of the wires at one edge of the fabric.

40. The combination, with the movable evening-plate 162, of the rod 165 connected thereto, the spring 168, the projection 170 secured upon said rod, and the ratchet-wheel
10 175 engaging said projection, for the purpose set forth.

41. In a machine of the class described, the combination, with a reel and a wire-coiler, of a tripping mechanism arranged between said
15 reel and said coiler, and over which the wire passes, said tripping mechanism being adapted to be moved and operated when the wire becomes caught or tangled or too great a tension is placed thereon, and a stop mechanism
20 controlled by said tripping mechanism.

42. In a machine of the class described, the combination, with the coiler and the reel, of a tripping mechanism arranged between said coiler and reel and adapted to be operated by
25 the wire when it does not feed freely from said reel.

43. In a machine of the class described, the combination, with a coiler, of independent reels, a tripping mechanism arranged between
30 said reels and said coiler, and adapted to be engaged by the wires passing from both reels and to be operated when either wire does not feed freely from its reel, for the purpose set forth.

44. In a machine of the class described, the combination, with the coiler, of the rolls 199 over which the wires pass before reaching said coiler, the slides upon which said rolls are mounted, and the tripping mechanism controlled by said slides. 35 40

45. In a machine for making coiled-wire fabric, the combination with parallel independent coiling-mandrels, of a rotatable section provided upon each mandrel, means upon said rotatable section for engaging the running wire, and independent means for adjusting said sections. 45

46. In a wire-coiler, the combination; with the parallel spirally-grooved mandrels, each provided at its forward end with a rotatable adjustable section, having a lug or shoulder thereon, of means for independently adjusting each of said sections, for the purpose set forth. 50

47. The combination, with the spirally-grooved mandrel 207 and means for feeding the wire thereto, of the adjustable pin 221 arranged over said groove and adapted to press upon the wire as it passes through said groove, for the purpose set forth. 55 60

In testimony whereof we have hereunto set our hands this 27th day of February, A. D. 1897.

CLARENCE O. WHITE.
MARSHALL B. LLOYD.

In presence of—

A. C. PAUL,
M. E. GOOLEY.