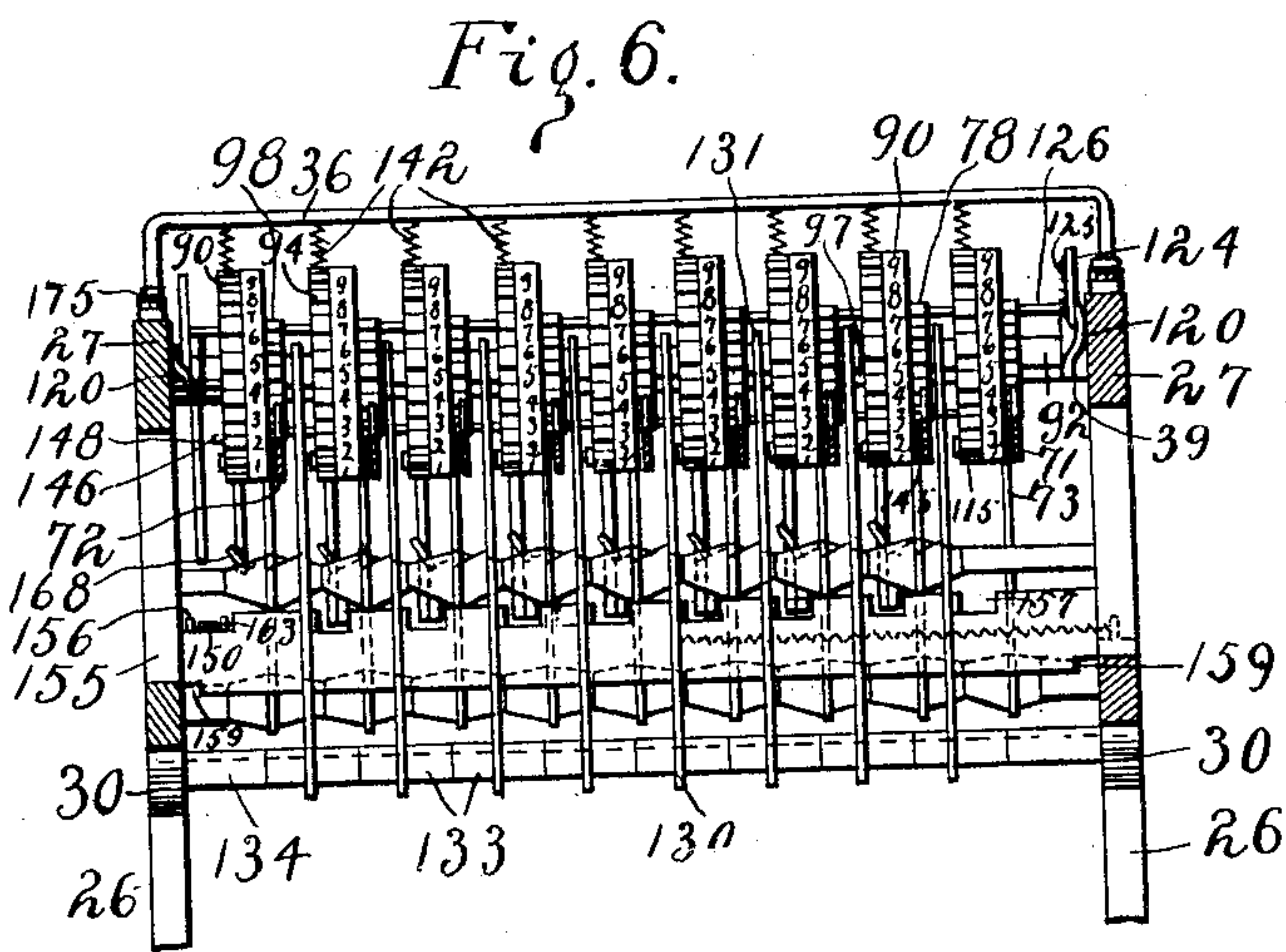
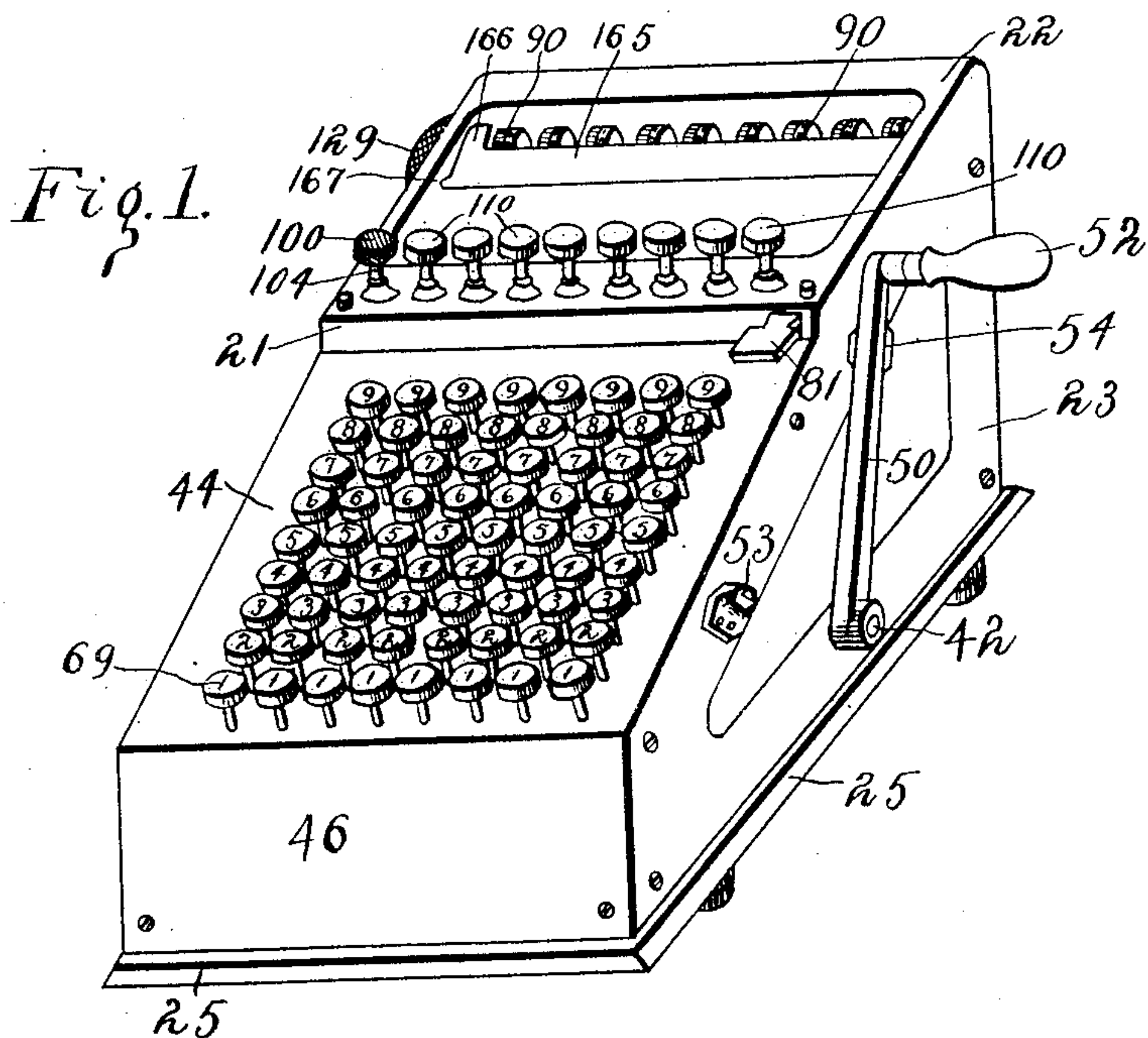


C. WALES.  
CARRYING MECHANISM FOR ADDING MACHINES.  
APPLICATION FILED SEPT. 17, 1902.

NO MODEL.

6 SHEETS—SHEET 1.



WITNESSES:

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PATENTED DEC. 1, 1903.

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6 SHEETS—SHEET 2.

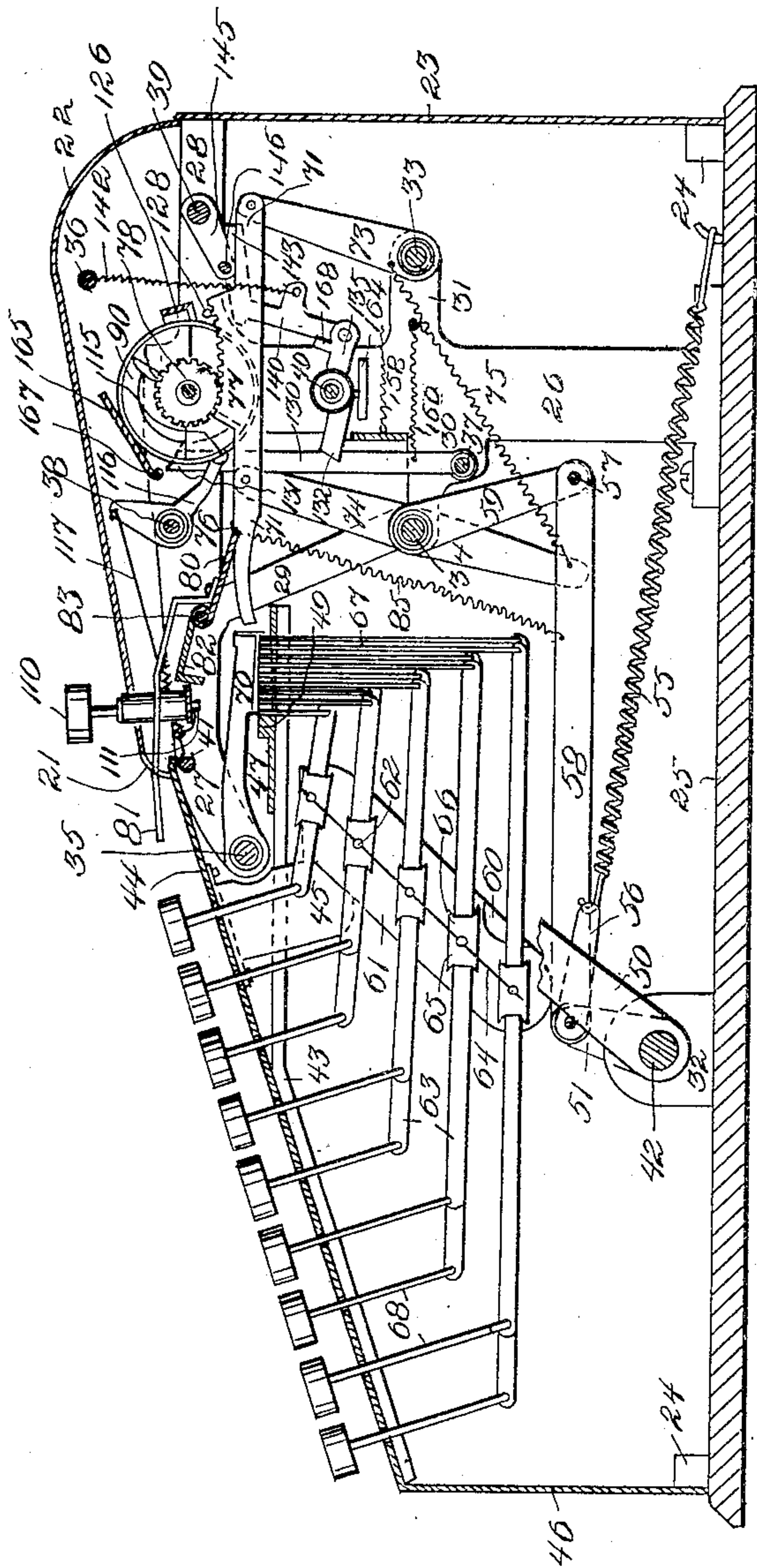


Fig. 2.

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6 SHEETS—SHEET 3.

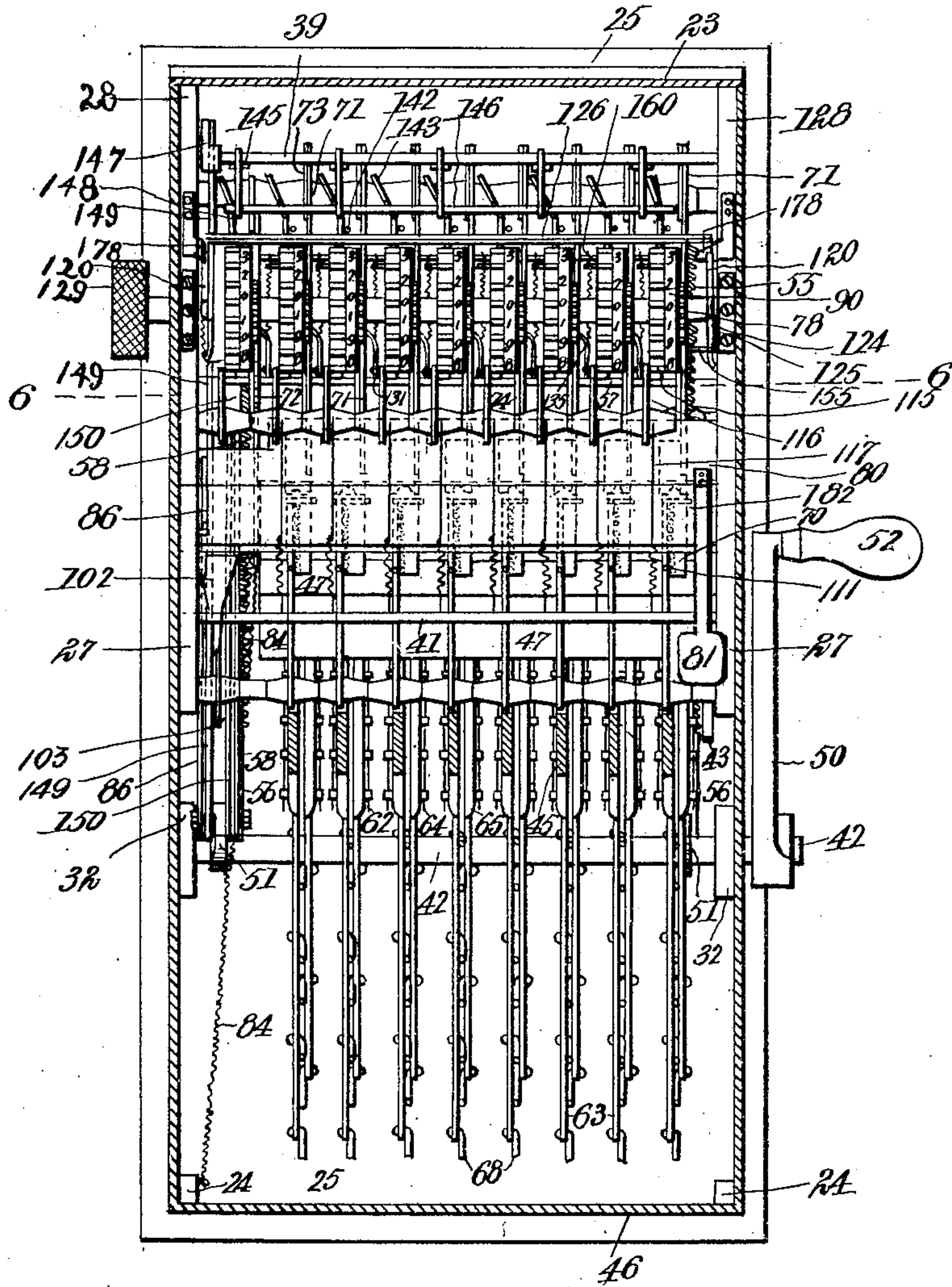


Fig. 3.

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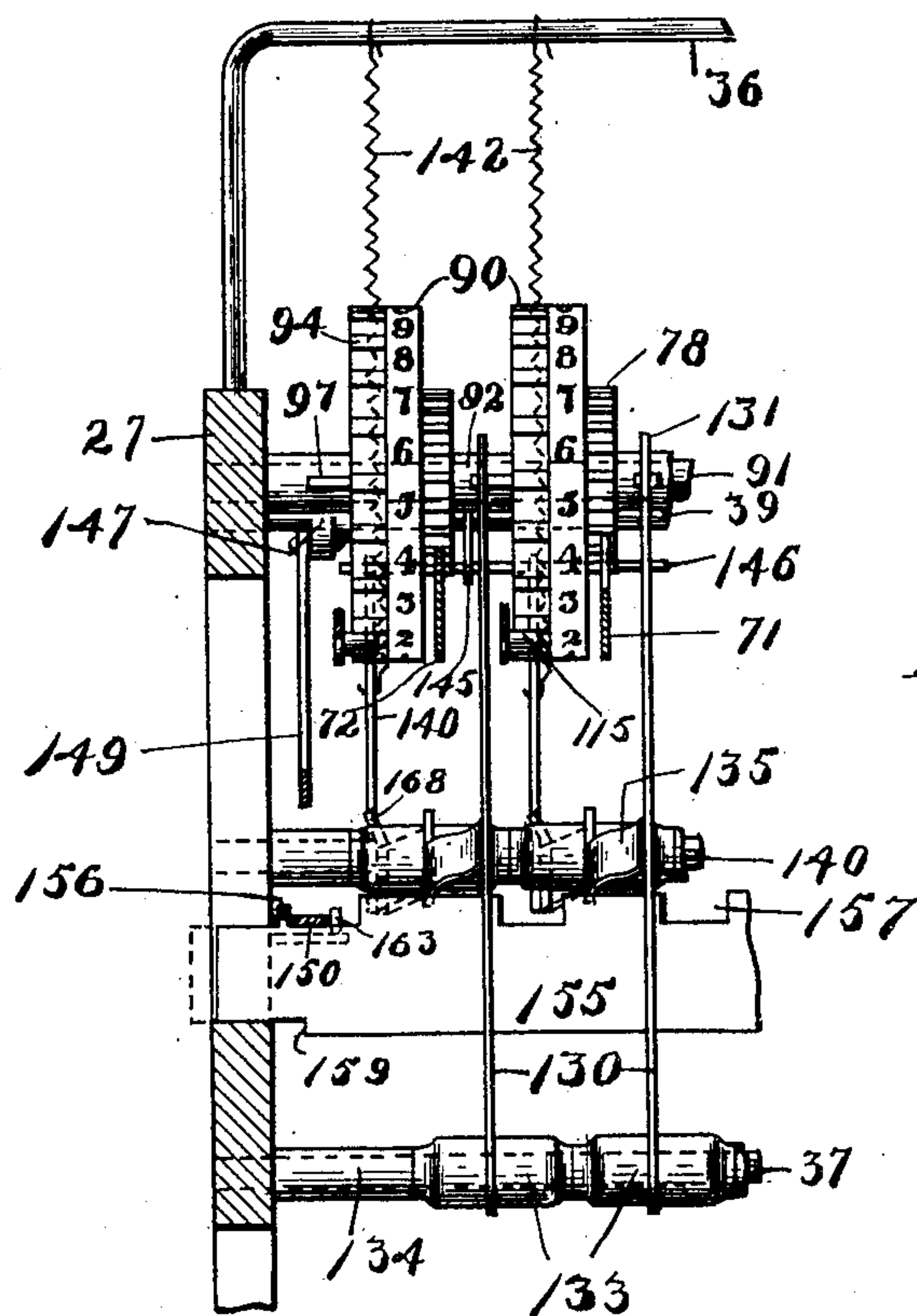
C. WALES.

# CARRYING MECHANISM FOR ADDING MACHINES.

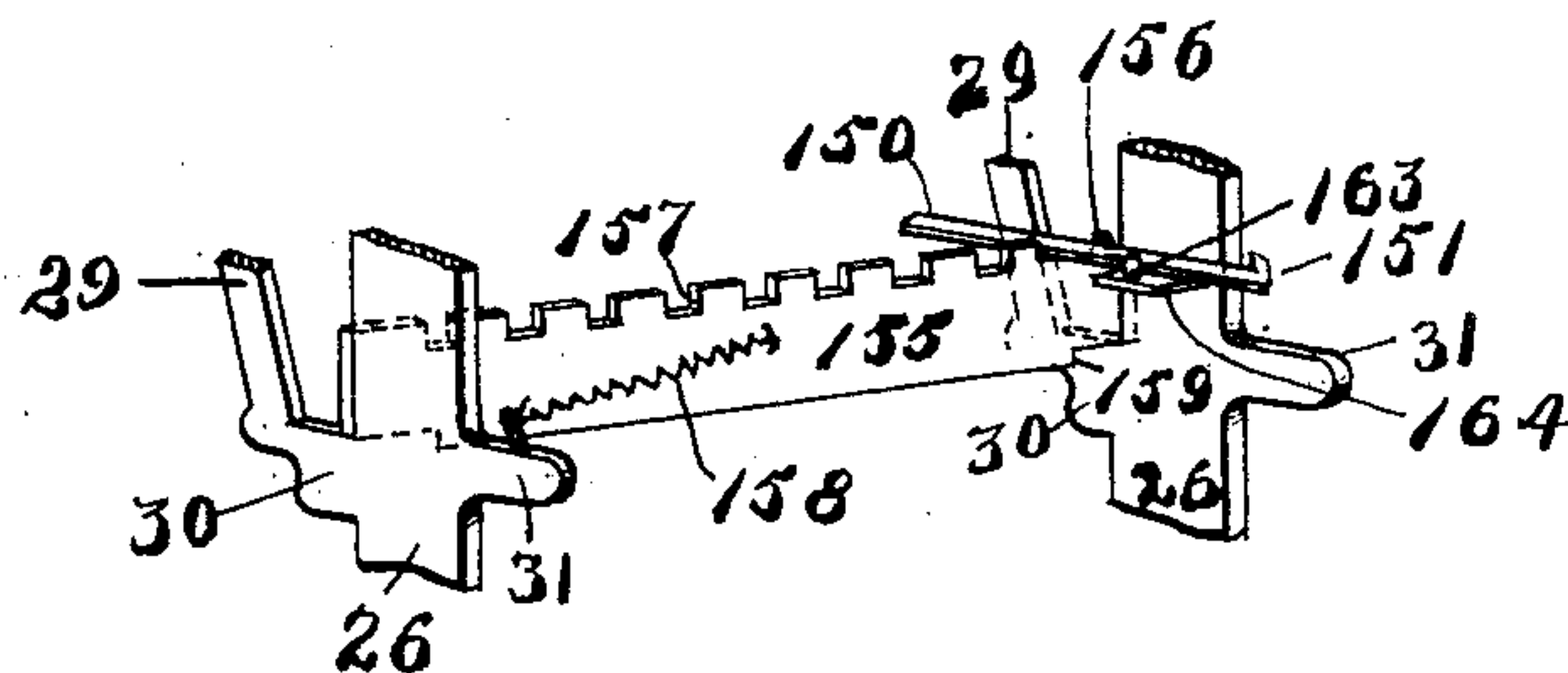
APPLICATION FILED SEPT. 17, 1902.

NO MODEL.

6 SHEETS—SHEET 4.



*Fig. 5.*



*Fig. 4.*

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## CARRYING MECHANISM FOR ADDING MACHINES.

APPLICATION FILED SEPT. 17, 1902.

NO MODEL.

6 SHEETS—SHEET 5.

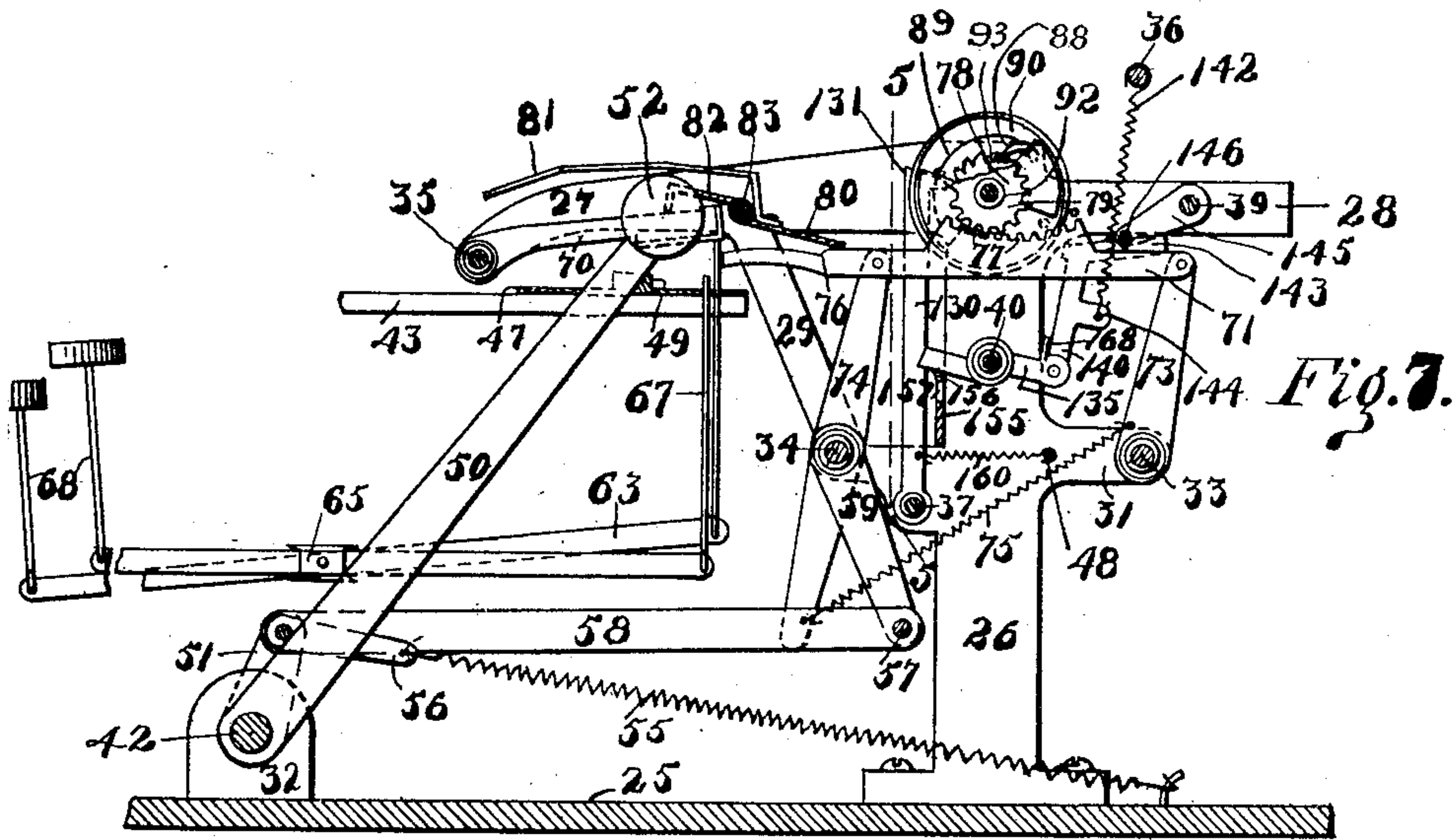


Fig. 7.

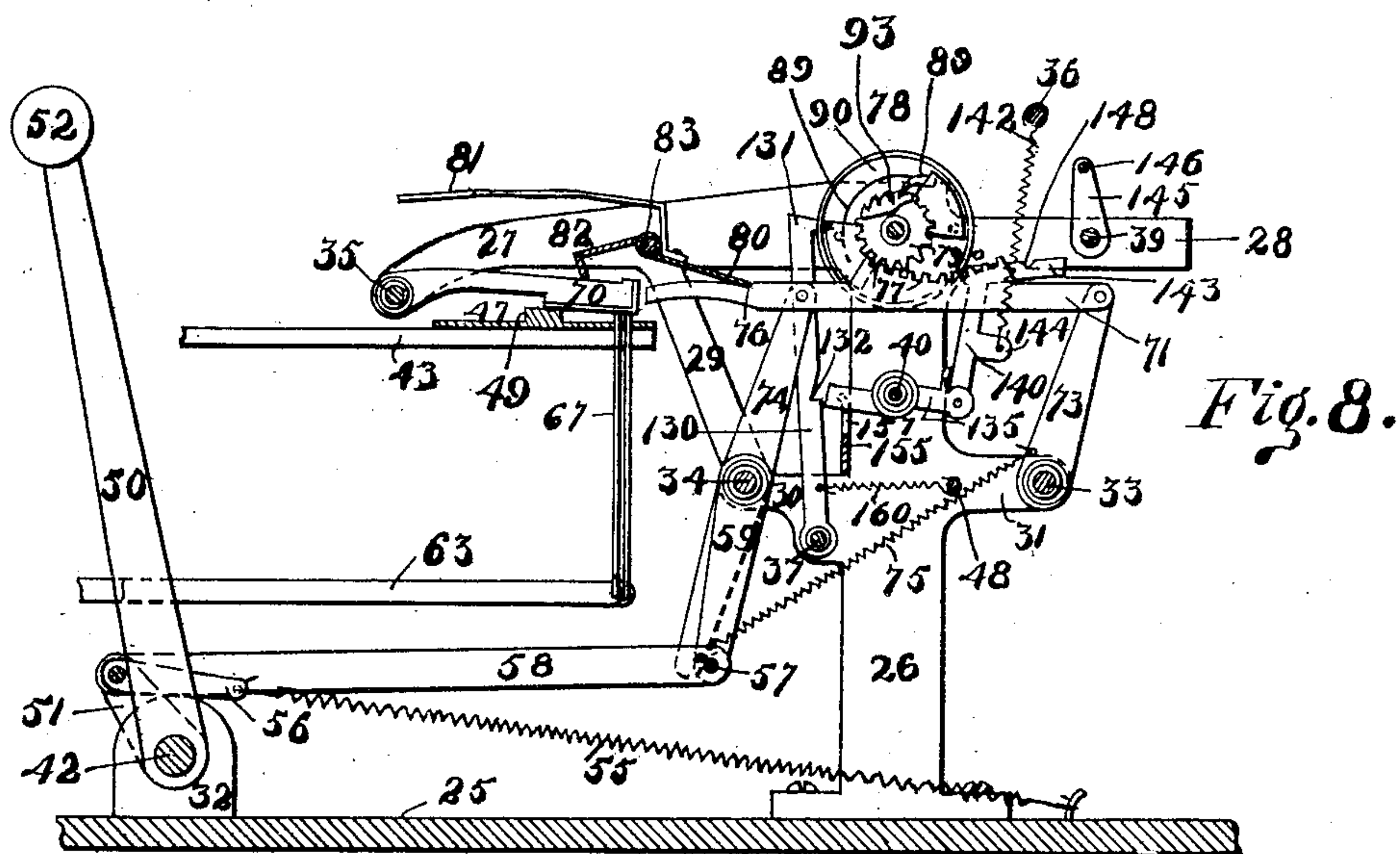


Fig. 8.

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CARRYING MECHANISM FOR ADDING MACHINES.

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NO MODEL.

6 SHEETS—SHEET 6.

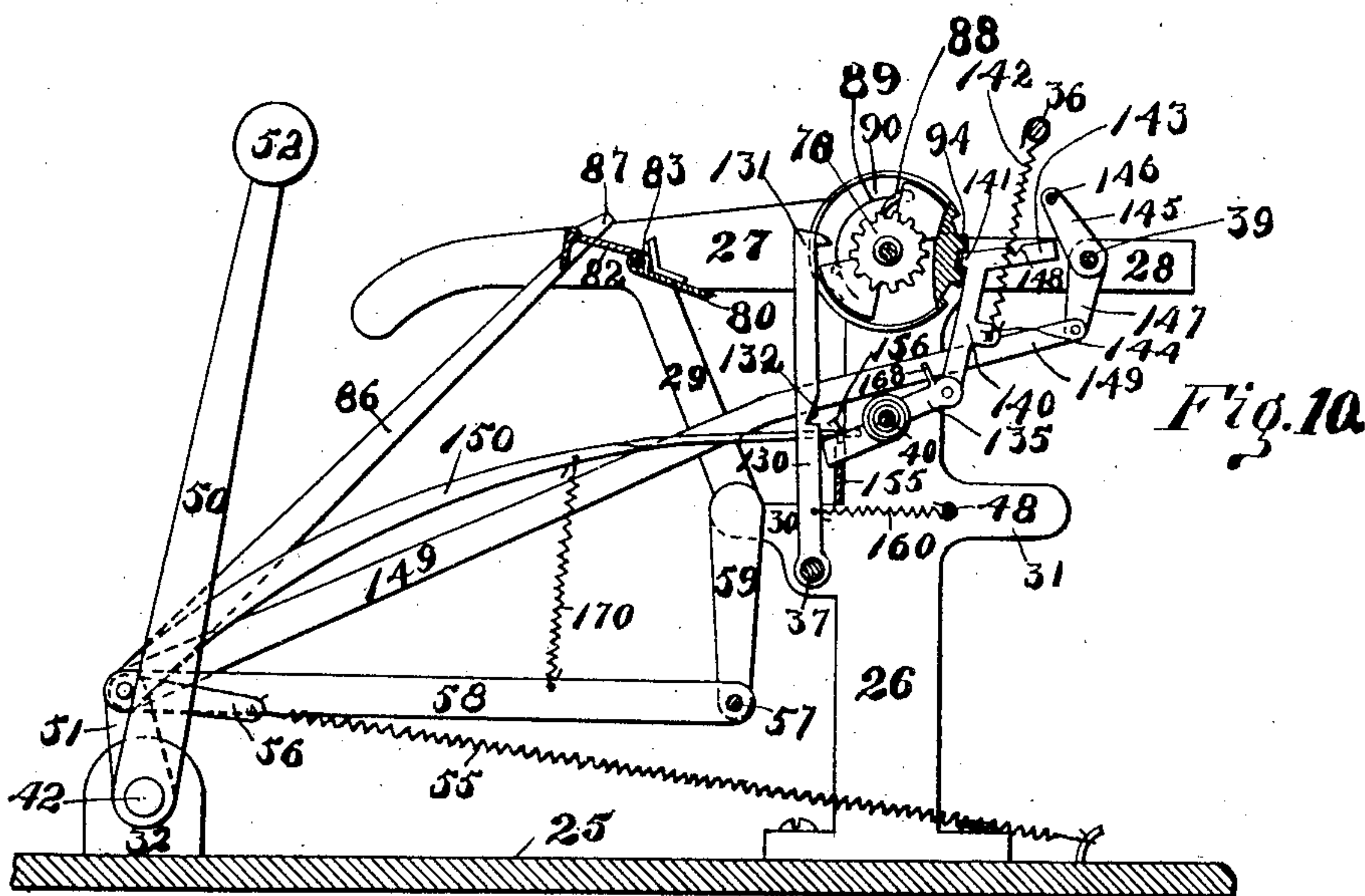
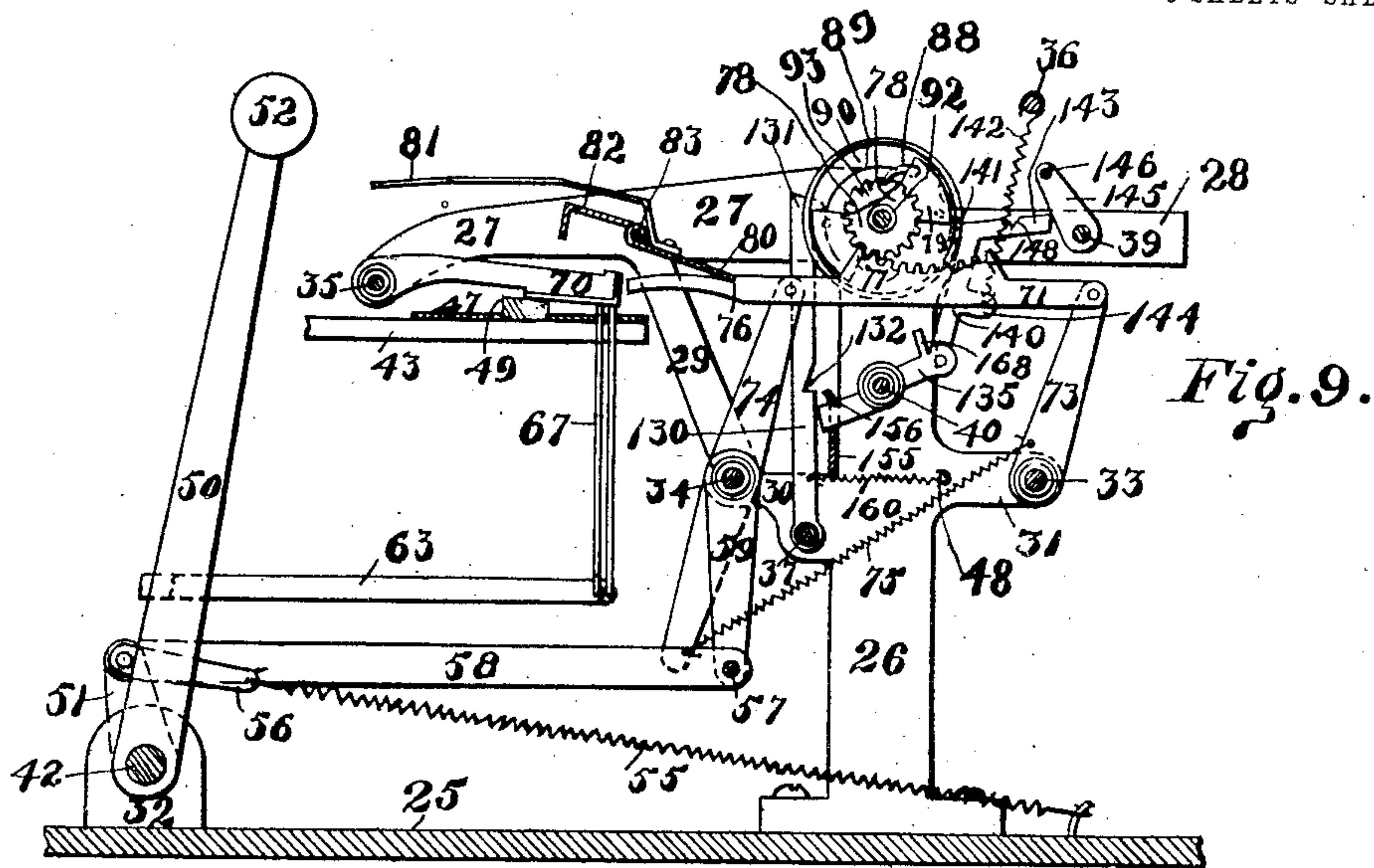


Fig. 11.

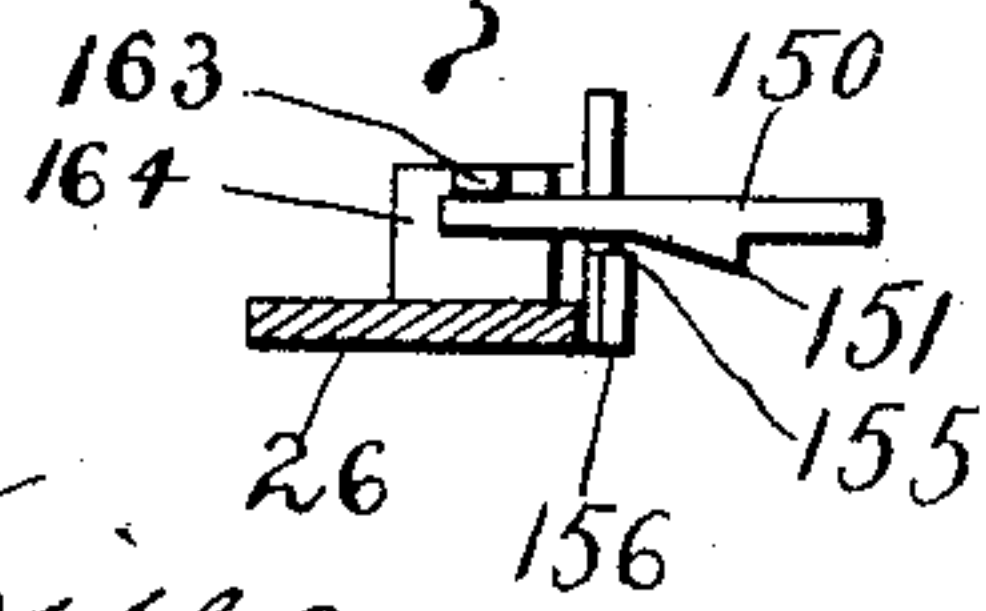
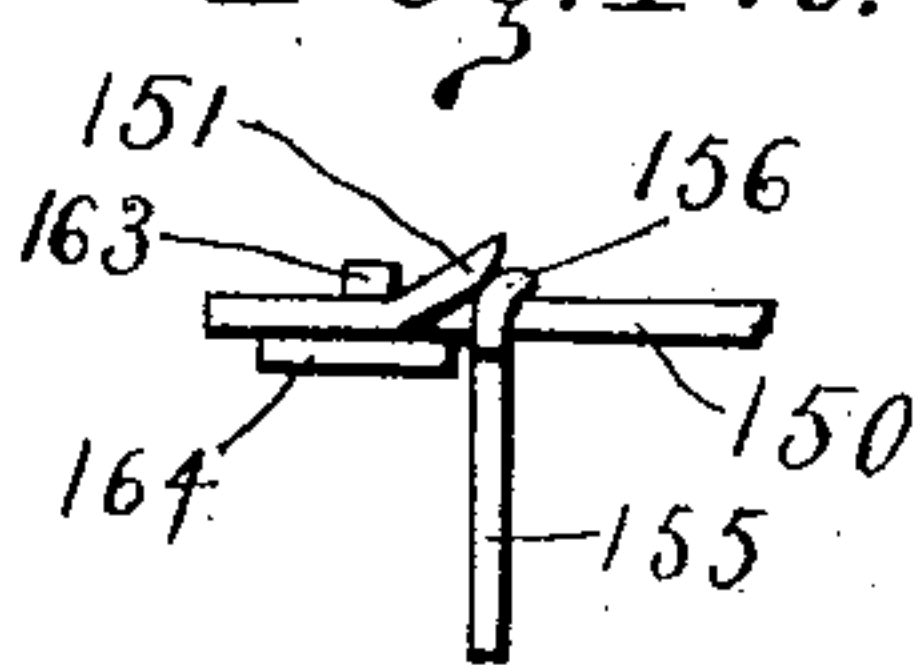


Fig. 12.



WITNESSES:

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BY William R. Baird

His ATTORNEY



# UNITED STATES PATENT OFFICE.

CHARLES WALES, OF DETROIT, MICHIGAN.

## CARRYING MECHANISM FOR ADDING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 745,542, dated December 1, 1903.

Application filed September 17, 1902. Serial No. 123,742. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES WALES, a citizen of the United States, and a resident of Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Carrying Mechanisms for Adding-Machines, of which the following is a specification.

My invention relates to adding-machines adapted to be operated by keys bearing numerals and provided with a sight-register for displaying the result of the calculation, and more particularly to that part of the mechanism designed to effect the operation of carrying a total from one column of figures to another when it reaches an amount greater than the highest unit adapted to be recorded in the first column.

I have already described and claimed the general features of the machine in which the particular mechanism herein described and claimed forms a part in a copending application filed by me on the 12th day of September, 1902, Serial No. 123,133, and refer to that application for a more particular description of the general mechanism involved.

In the drawings, in which the same reference-numerals refer to the same parts in all of the figures, Figure 1 is an exterior perspective view of the machine. Fig. 2 is a side elevation of a train of mechanism for one section of the machine and some adjacent parts. Fig. 3 is a plan view of the machine with some of the upper parts removed. Fig. 4 is an enlarged detail in perspective of the sliding bar and portions of some adjacent parts. Fig. 5 is an enlarged detail of one end of the mechanism as shown in Fig. 6. Fig. 6 is a front view of the upper parts of the machine back of the plane of the line 6 6 in Fig. 3. Fig. 7 is a side view of the carrying mechanism and some of the parts of the machine relating more particularly thereto. Fig. 8 is a view similar to Fig. 7, showing the same parts in different positions. Fig. 9 is a similar view showing the same parts in yet different positions. Fig. 10 is the same as Fig. 9 with additional parts added. Fig. 11 is a top plan view of a portion of the sliding bar 155 and its operating mechanism, and Fig. 12 is a detail elevation of the parts shown in Fig. 11.

The machine has a keyboard and key-le-

vers which will remain in either one of their two positions until moved therefrom by an impulse received from the operator through the keys or other parts of the machine. These levers operate a series of stops and interpose them into the path of the racks which determine the rotation of the numeral-wheels, the position of the particular stop thus interposed determining the extent of the wheel's rotation, and consequently the particular numeral on the periphery of the wheel in view when the rotation is checked.

The numeral on the key corresponds to the number displayed when the wheel comes to a standstill. A stop-and-release plate is employed, which holds the racks until the number desired to be added has been written on the keyboard. The racks are returned to their original positions through the action of a main operating-lever, which simultaneously rotates the numeral-wheels communicating with the racks which have been displaced. The wheels are returned to zero by means of a rake which has a rotary motion parallel to the wheels and which engages pins thereon. These pins also serve to set the carrying mechanism, which is the subject-matter of this present application and which when one wheel passes the numeral "9" causes the next wheel to be moved one step or number.

Most of the working parts of the machine are held at rest by springs, which immediately return them to their normal positions after each operation.

The frame of the machine is supported upon a rectangular base-plate 25, having studs 24 at its corners to hold in position a suitable casing 23. Uprights 26 on either side are provided with forward arms 27 and backward arms 28 at their upper parts, the former being connected to the center of the upright by a brace 29, which connects with a short arm 30. Another short arm 31 extends backward from the upright opposite the arm 30. These parts are preferably made integral and stamped out of one piece of metal. The duplicate sides of the frame thus constructed are connected by a series of horizontal bars, including those designated by the reference-numbers 33 to 41, inclusive, running through the machine and fixed at their ends to the said pieces of the frame.



Posts 32, one at each side of the base-plate, at the forward end thereof, have a shaft 42 rotatably mounted thereon, and to this shaft an operating-crank 50 and two short arms 51 are  
 5 keyed. The crank 50 is provided with an ordinary handle 52, by which it is drawn forward to operate the machine. It is restricted in its forward movement by a stop 53 and is held normally in its backward position against  
 10 a stop 54 by a tension-spring 55, connected to the right arm 51 through a link 56. The crank in its oscillation describes an arc slightly less than ninety degrees.

The keyboard, levers, and stops are made  
 15 separable from the other parts of the machine and may be removed from the machine and replaced without disturbing the same in any way.

Each key-lever 63 has a vertical stop-rod  
 20 67 on its inner end, the rods connected with each row of keys and levers being alined in substantially the same plane therewith. As the key-levers are arranged in parallel pairs, the ends of the stop-rods 67 attached at one  
 25 end and of the key-rods 68 attached at the opposite end are bent slightly near the points of attachment to secure perfect alinement of the upper ends with these rods. The levers 63 also are made of unequal length to secure  
 30 the proper spacing of the rods and keys. The stop-rods 67 are of graduated lengths, so that their upper ends will be normally in the same plane, and upon them resetting-dogs 70 impinge. One of these dogs 70 is provided for  
 35 each row of stops and serves the double purpose of checking the movement of the rack to which it is opposed and of returning the displaced stop and key to their original positions after an operation or when acted upon  
 40 by the resetting mechanism.

Reciprocating rack-bars 71 are supported upon the upper ends of rocking arms 73 and levers 74, which are mounted upon the horizontal bars 33 and 34, respectively. A tension-  
 45 spring 75 is secured to the arm 73 above its pivot and to the lever 74 below its pivot, so that the said spring 75 has a tendency to throw the upper ends of said parts and the rack-bar itself forward. Each rack-bar 71  
 50 is held in its backward position by a release-plate 80, which engages a notch 76 in the upper edge thereof. Its forward movement is still further restrained by the dog 70, which lies normally in its path.

The plate 80 rocks upon a bar 83, mounted  
 55 in the side frames, and has an arm 81 extending from one end through a lip 21, which forms the rear end of the front section 22 of the cover, by pressing which arm the plate  
 60 may be released from engagement with the rack-bars. A resetting-plate 82, extending in the opposite direction, is also mounted on the bar 83.

The rack-bars 71 are provided with racks  
 65 77, which are constantly in mesh with pinions 78, which are rotatably mounted on the wheel-shaft 91. These racks are curved to compen-

sate for the digression of the rack-bar 71 from the horizontal in its movements, the curve being the reverse of the arc described by the arm 73 and lever 74. 70

The pinions 78 move independently of the numeral-wheels 90 and carry with them sectors 79. A pawl 88 with a spring 89 is mounted upon each sector. The numeral-wheels 90, with  
 75 their respective pinions, are separated and held in their longitudinal positions on the shaft 91 by small collars 92.

Each one of the wheels 90 has a ratchet 93 fixed thereto, which is engaged by the pawl 80 88, so that when the pinion 78 and its pawl 88 are rotated by the backward movement of the rack 77 the pawl will engage the ratchet 93 and rotate it in proportion to the extent of the  
 85 backward movement of the rack, which movement is equal to its forward movement as determined by the particular stop interposed into its path.

The backward movement of the racks is accomplished by the forward movement of  
 90 the operating-crank 50 and arm 51, which draws forward the rods 58, secured to said arms, and the cross-bar 57, extending across the machine and secured at its ends to the rear ends of the rods 58. As the bar 57  
 95 moves forward it will carry with it any of the lower ends of the levers 74 which may be back of their normal positions. It will be seen that this movement of the levers 74 causes the  
 100 backward movement of the racks 77 and the consequent rotation of the wheels 90. The rod 57 is supported by swinging arms 59, depending from the bar 34, and is returned to its original position after a forward movement  
 105 by the retraction of the spring 55.

The key-resetting mechanism comprises a rod 86, provided with a hook 87, which extends from one of the arms 51 through the plate 82. It will appear that as the arm 51  
 110 moves forward the hook 87 will engage the plate 82 and cause the latter to press the dogs 70 down upon the upper ends of the stop-rods 67 until the dogs are brought into contact with the thickened portion 49 of the plate 47, and thus return the rods 67 to their normal  
 115 positions. The plate 82 is returned to its position by a tension-spring 101, which forces the upper part of the rod 86 against it.

Pins 97, projecting laterally in pairs from the numeral-wheels 90, are diametrically opposite each other in juxtaposition to the "5" mark of the wheel. They form an essential part of the zero-setting mechanism and also serve to set in operation the carrying mechanism, which acts to move each wheel one step  
 125 or number when the next wheel to the right passes the numeral 9. A trigger 130 with a beveled head 131 is located adjacent to each numeral-wheel and secured at its lower end to a sleeve 133 on the bar 37 and held in its  
 130 rearward position by a spring 160, secured at its other end to a transverse bar 48. In a notch 132 of the trigger 130 the forward end of a small connecting-lever 135, pivoted on



the bar 40, is held, and to the opposite end of this lever is connected a jack 140. A tension-spring 142 is secured to a central rearward projection 144 on this jack and is also secured at its upper end to the bar 36, which is raised intermediate its ends above the frame of the machine. The purpose of this spring 142 is to lift the jack and throw forward its upper end, formed as a cog-tooth 141, whereby the said cog-tooth will engage the teeth 94 on the numeral-wheel 90 and at the same time cause by its upward action the rotation of said wheel. Sleeves 134 on the bar 37 separate the endmost sleeves 133 from the side frame.

As the numeral-wheel rotates it reaches a point where the "9" mark passes the rule 165, mounted on the bar 167, which is half a revolution, and the pin 97 strikes the beveled surface of the trigger-head 131 and throws the trigger forward, thus releasing the end of the connecting-lever 135 and causing the same to bear upon the upper edge of a laterally-sliding bar 155. This movement takes place as the main crank 50 and its arm 51 are drawn forward. The sliding bar 155 is supported at its ends on the arms 30 of the side frames and has mortises 157, one for each lever 135, in its upper edge and a lug 156 at one end adapted to engage the head 151 of arm 150 to move the bar lengthwise in one direction to the left. The movement of the bar 155 in the opposite direction is caused by a spring 158, which has one of its ends connected near the middle of the bar and the other of it ends connected to the arm 31. The movements of the bar 155 are checked at the proper point by steps 159 at each end and which abut against the arm 30. The lug 156 is bent slightly forward and the head 151 projected on the left side of the arm 150 and is turned upwardly on its forward edge, so that it will pass over the lug in moving forward and drop down to the right near the end of said movement, its point always resting on bar 155. The arm is held down by a spring 170, connecting with the rod 58.

The arm 150 is attached at its lower end to the crank-arm 51, so that it will move forward and backward with said crank-arm. The inclined surface of the outer end or head 151 in moving backward engages the lug 156, and thus forces the bar 155 to slide to the left, the arm 150 being supported laterally during this action by a pin 163 on a projection 164 of the side frame. When the bar 155 slides to the left, the recesses 157 are brought beneath the forward ends of the levers 135, and when one of these levers has been released from the notch 132 this action will trip the carrying-jack 140, which jumps upward when the lever end enters the recess 157, thus causing the cog 141 to engage with the teeth 94 of the numeral-wheel 90, and thereby moves the said wheel one step. This action, as will be seen, takes place with the backward movement of the main crank. As the crank 50 and the arm 51 move farther backward a rod 149, se-

cured to the latter, will rotate the bar 39 by means of an arm 147 fixed thereto and cause a depressing-bar 146 on arms 145 to bear down upon a rear extension 143 of the jack 140 and restore it to its former position, where it is then held by the engagement of the lever 135 with the trigger-notch 132 until the mechanism is again set in motion. The bar 146 rests normally in notches 148 in the extensions 143 provided therefor and moves up and down with each oscillation of the crank 50, restoring to position in its downward movement any of the jacks which may have been in operation. When the jack has been depressed to the proper position, the depressing motion is checked by a bent pin 168 on the connecting-lever 135, which is brought into contact with the forward edge of the jack, near the point of its connection with said lever 135.

It will be seen that when one of the numeral-wheels is at "9" and it is moved a step or number by the carrying mechanism set in operation by the next wheel to the right it will trip the carrying mechanism for the next wheel to the left, thus advancing the wheel to the left one step or number. For instance, let us assume that the number registered is "94" and that it is desired to add six to this number, thus advancing the total number to "100." As the first wheel on the right passes "9" with the forward movement of the main operating-crank it trips the carrying mechanism for the next wheel to the left, so that on the return movement of the crank this wheel is advanced to "0;" but this movement carries the second wheel past "9," and therefore trips the carrying mechanism for the third wheel, and as the aperture in the sliding bar is already beneath the connecting-lever 135 for the carrying mechanism of this wheel it will move almost simultaneously with the second wheel to "1," thus giving the total "100."

What I claim is—

1. The combination of registering-wheels, means for moving the same individually, a carrying mechanism connected with said moving mechanism comprising projections on said wheels, a tripping mechanism adapted to be operated by contact with said projections when one or more of the wheels passes a point where the figure 9 is registered, and a laterally-reciprocating recessed bar acting in conjunction with said tripping mechanism.

2. The combination of registering-wheels, means for operating the same individually, a carrying mechanism connected with said operating means comprising a tripping mechanism adapted to be set in operation by contact with said registering-wheels, a jack, cogs on said registering-wheels adapted to be engaged by said jack, means for maintaining a constant pressure on said jack in the direction of the cogs, and a laterally-reciprocating bar having recesses for setting the jack to act.

3. The combination of registering-wheels, means for operating each of said wheels in-



dependently of the others, a carrying mechanism connected with said operating means comprising a trigger adapted to be set by contact with a registering-wheel, a jack held normally out of contact with said wheels and adapted to engage the same when tripped, and a reciprocating bar provided with apertures or recesses intermittently in the path of a portion of the tripped mechanism.

10 4. The combination of registering-wheels, mechanism for operating the same individually, a carrying mechanism connected with said operating mechanism comprising projections on said wheels, triggers normally in the path of said projections, connecting-levers held in position by contact with said triggers, and means whereby said wheels are moved one step or number through the disengagement of said levers from the triggers, and a laterally-reciprocating bar having recesses to receive the levers.

5. The combination of registering-wheels, mechanism for moving the same individually, and carrying mechanisms connected with the said moving mechanism comprising a projection on a register-wheel, an arm having a portion in the path of said projection, a lever held in position by contact with said arm, a jack connected to said lever, cogs or teeth on register-wheels, means for maintaining a constant tendency of said jack in the direction of the cogs, whereby the contact of the projection on the wheel disengages the connecting-lever and allows the jack to engage the cogs, and a laterally-reciprocating bar having recesses to receive the end of the lever.

6. The combination of register-wheels, mechanism for operating the same individually, and carrying mechanism connected with said operating means comprising a projection on one wheel, a trigger having a portion normally in the path of said projection, a lever held in position by contact with said trigger,

a jack, cogs on the wheel next to the one first mentioned, and means for impelling said jack into contact with said cogs when the lever is disengaged from the trigger, and a laterally-reciprocating bar having recesses to receive the end of the lever.

7. The combination of register-wheels, means for operating the same individually, and carrying mechanism connected with said operating means comprising a pivoted arm, a projection on one of the register-wheels, a cogged portion on the adjoining register-wheel, a jack and means for maintaining a constant tendency of said jack in the direction of the cogs on said adjoining wheel, an arm having a portion normally in the path of the projection on the first-named wheel, a lever connected with said jack and held in position by contact with said arm, whereby, when the projection on the first wheel contacts with the arm, the jack will be caused to engage the cogged portion of the adjoining wheel, and a laterally-reciprocating bar having recesses to receive the end of the lever.

8. The combination of register-wheels, mechanism for operating the same individually, and carrying mechanism connected with said moving mechanism comprising a tripping means operated by one wheel, and adapted to move the adjoining wheel one step or number, a laterally-reciprocating bar having recesses and acting in conjunction with said tripping mechanism and a rock-bar connected with the said operating mechanism for returning said carrying mechanism to its normal position.

Witness my hand this 28th day of August, 1902, at the city of Port Huron, in the county of St. Clair and State of Michigan.

CHARLES WALES.

Witnesses:

PETER J. ABT,

WM. L. JANUARY.