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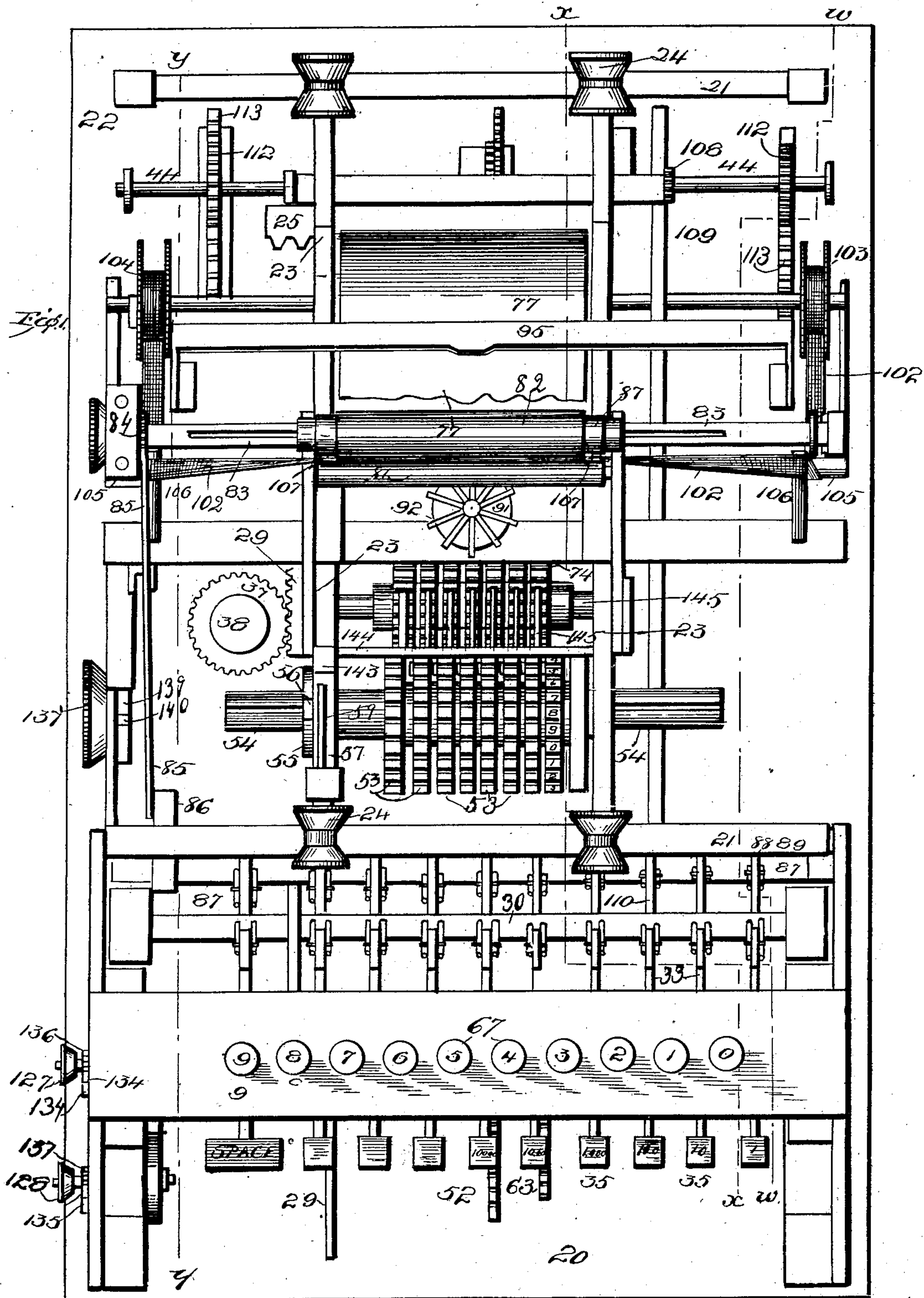
PATENTED MAY 19, 1903.

A. DE L. GILPIN.
ADDING MACHINE.

APPLICATION FILED JULY 12, 1902.

NO MODEL.

5 SHEETS—SHEET 1.



Witnesses:
J. M. Fowler Jr.
N. Waller.

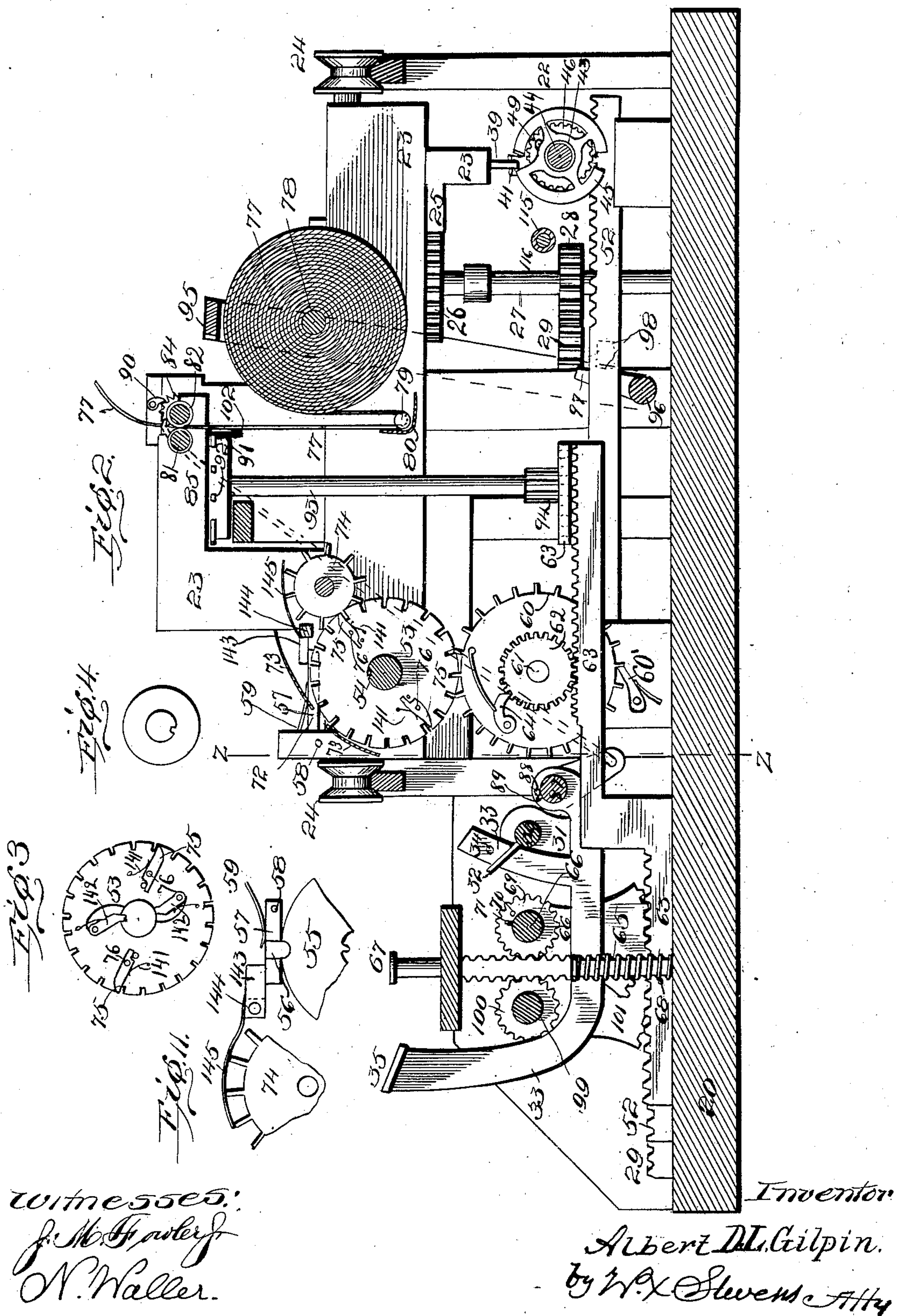
Inventor:
Albert D. Gilpin.
By W. X. Stewart, Attor.

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5 SHEETS—SHEET 2.



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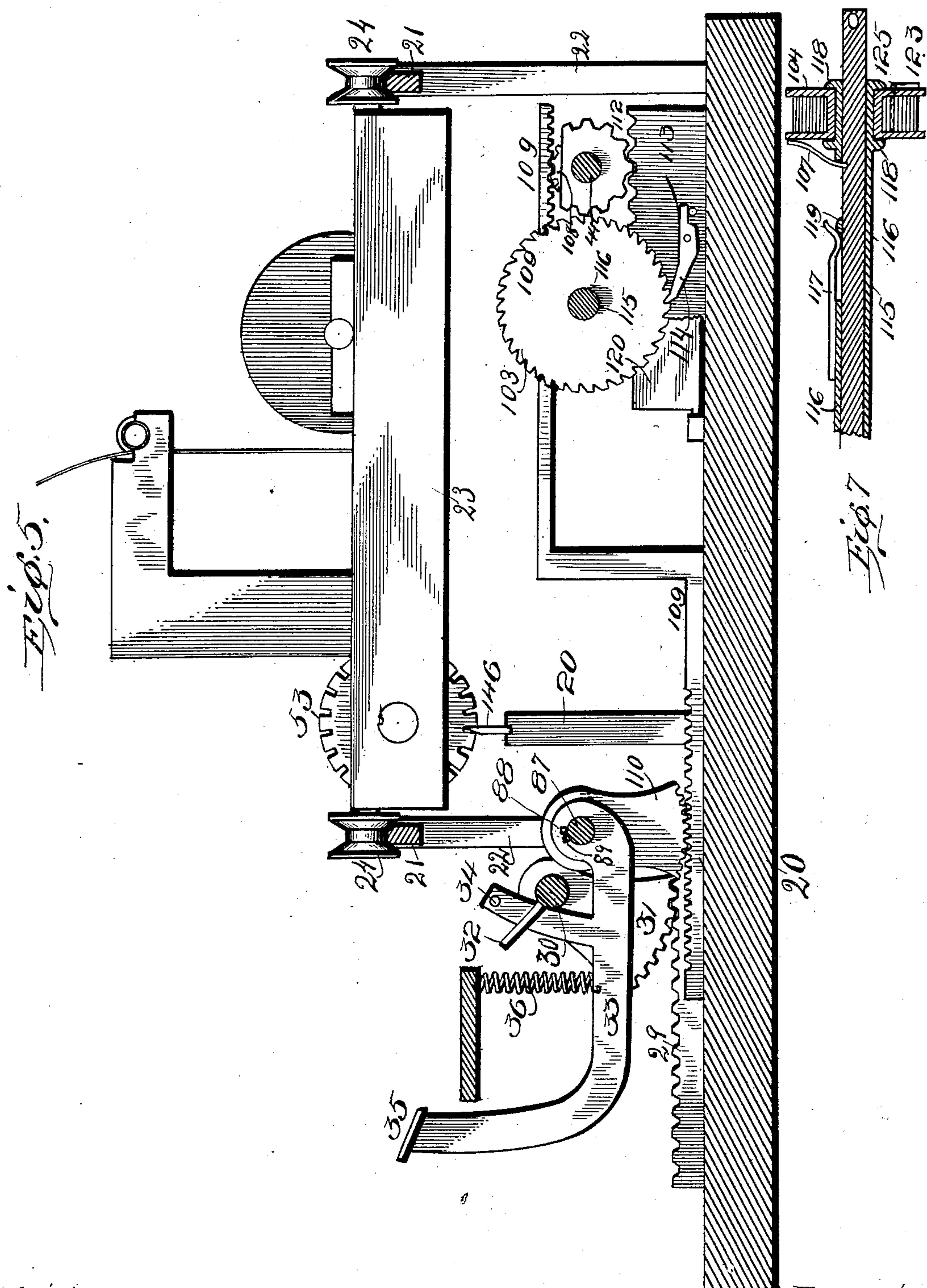
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5 SHEETS—SHEET 3.



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5 SHEETS—SHEET 4.

NO MODEL.

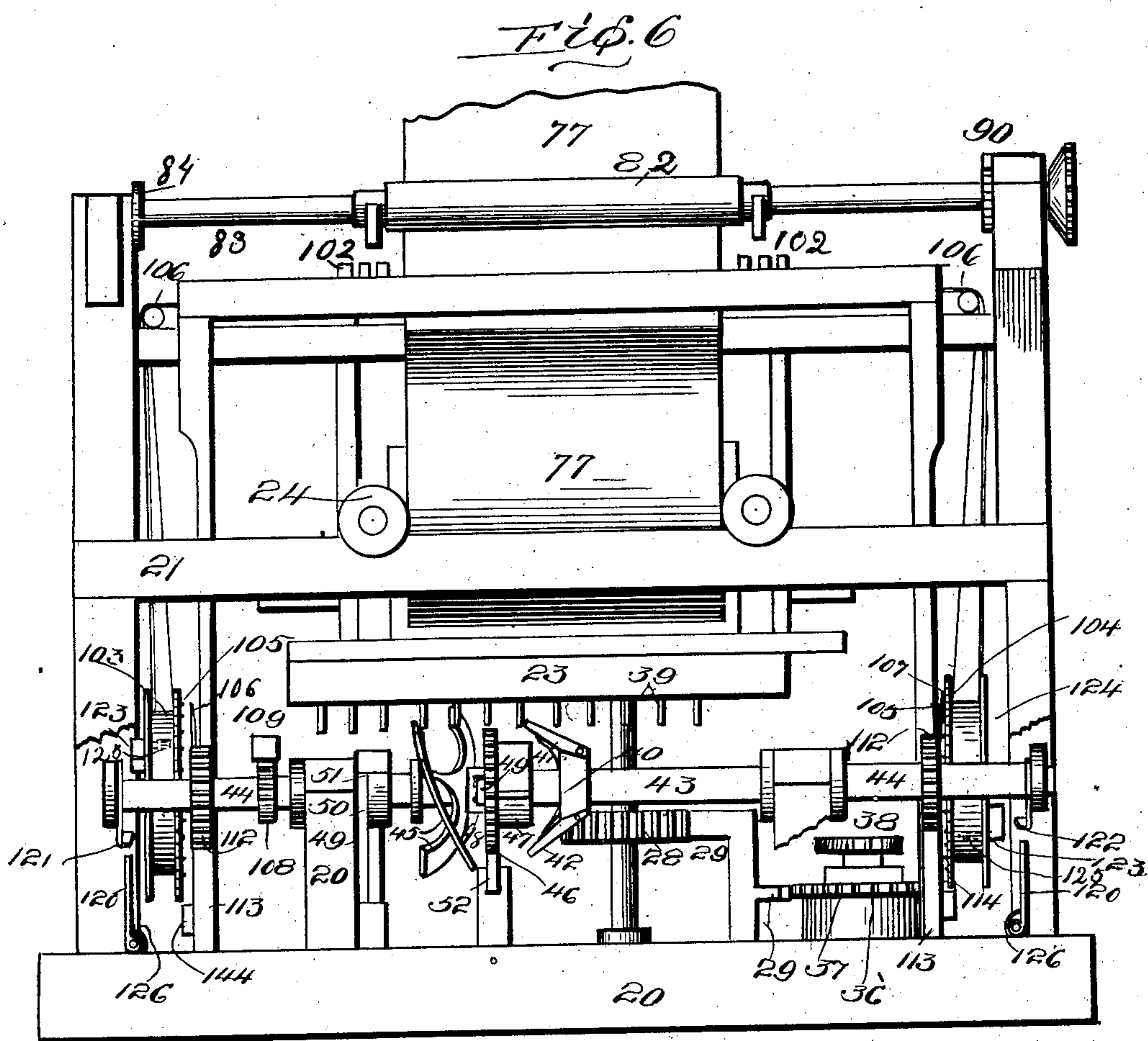


Fig. 8

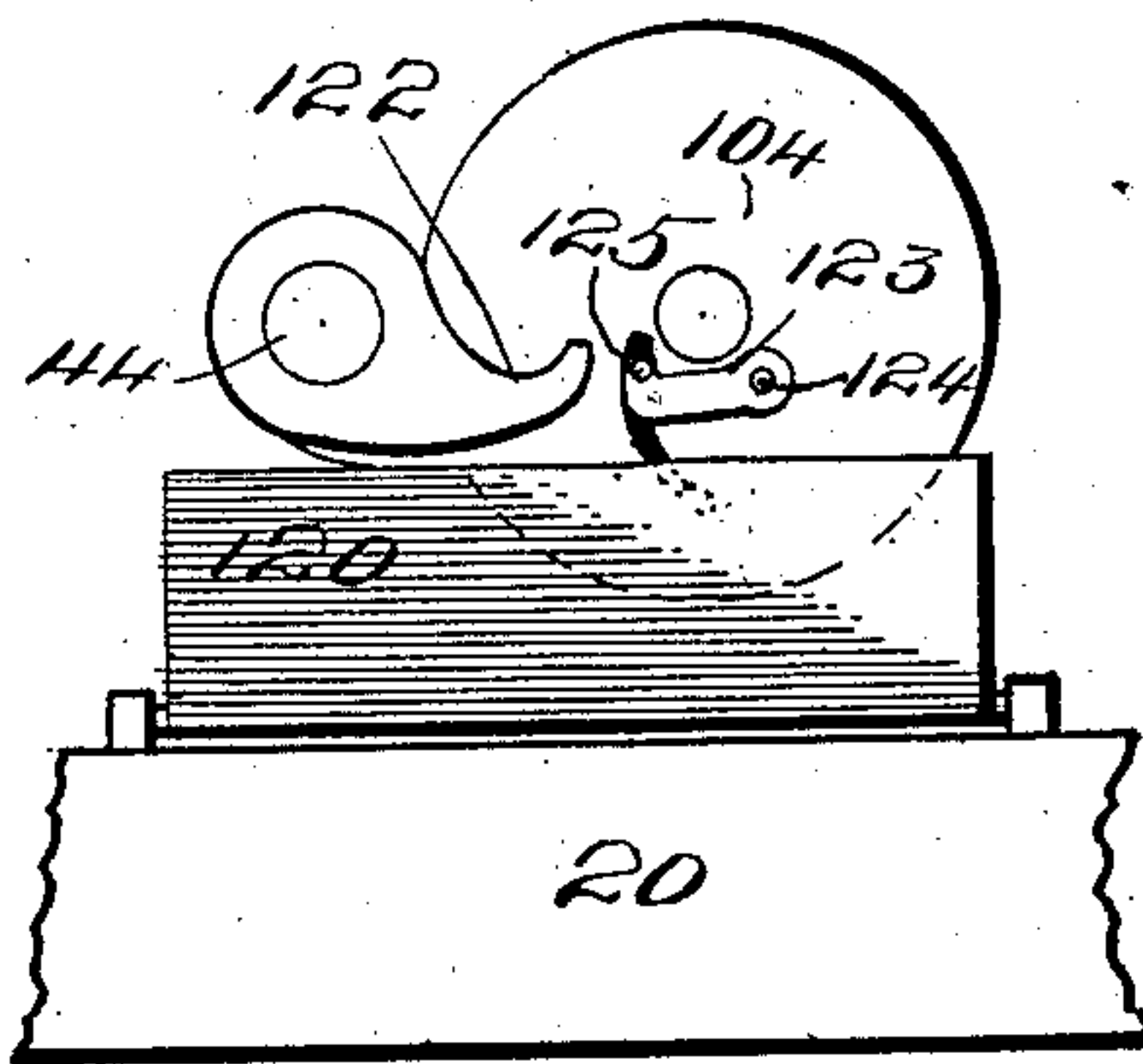
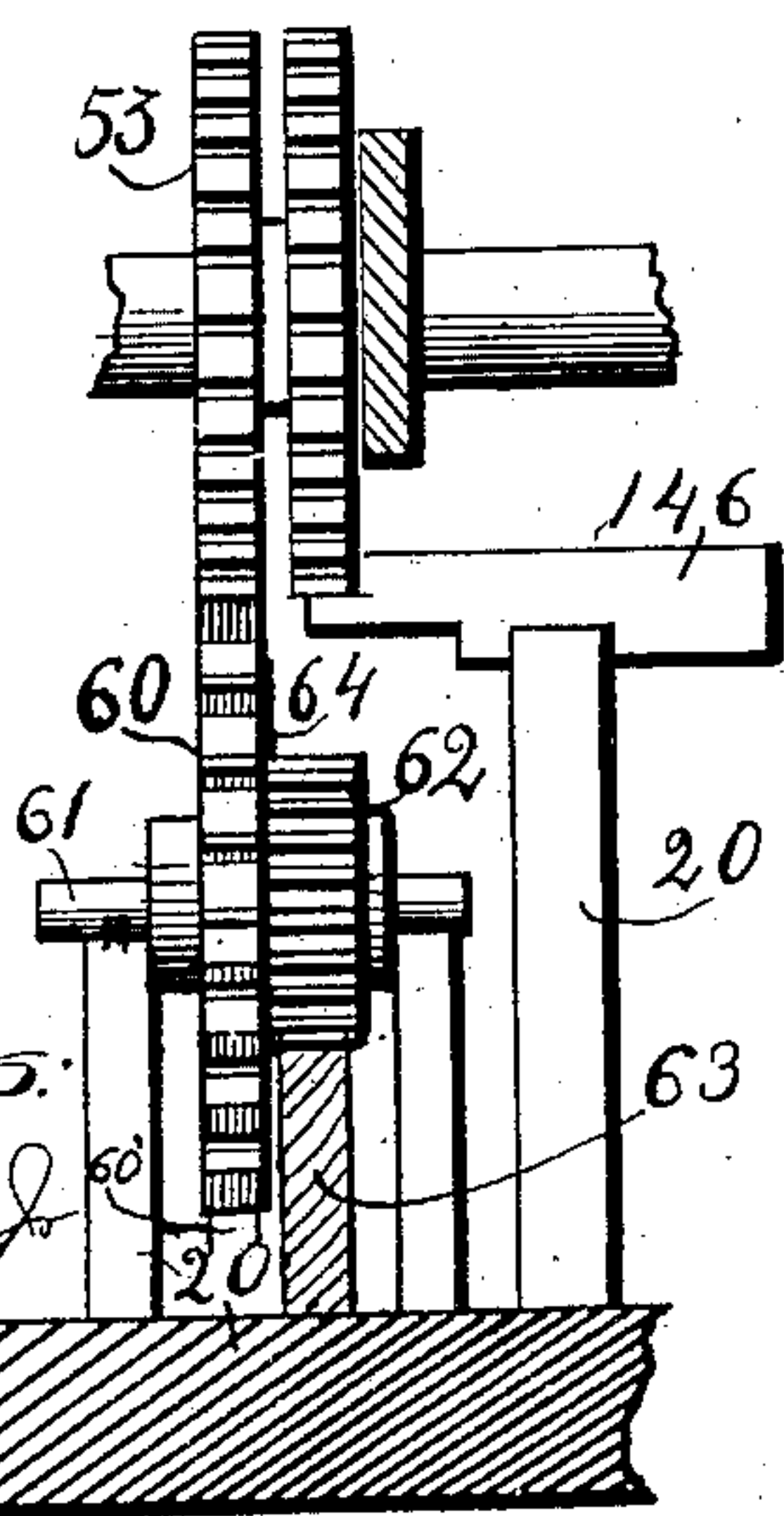


Fig. 9



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No. 728,223.

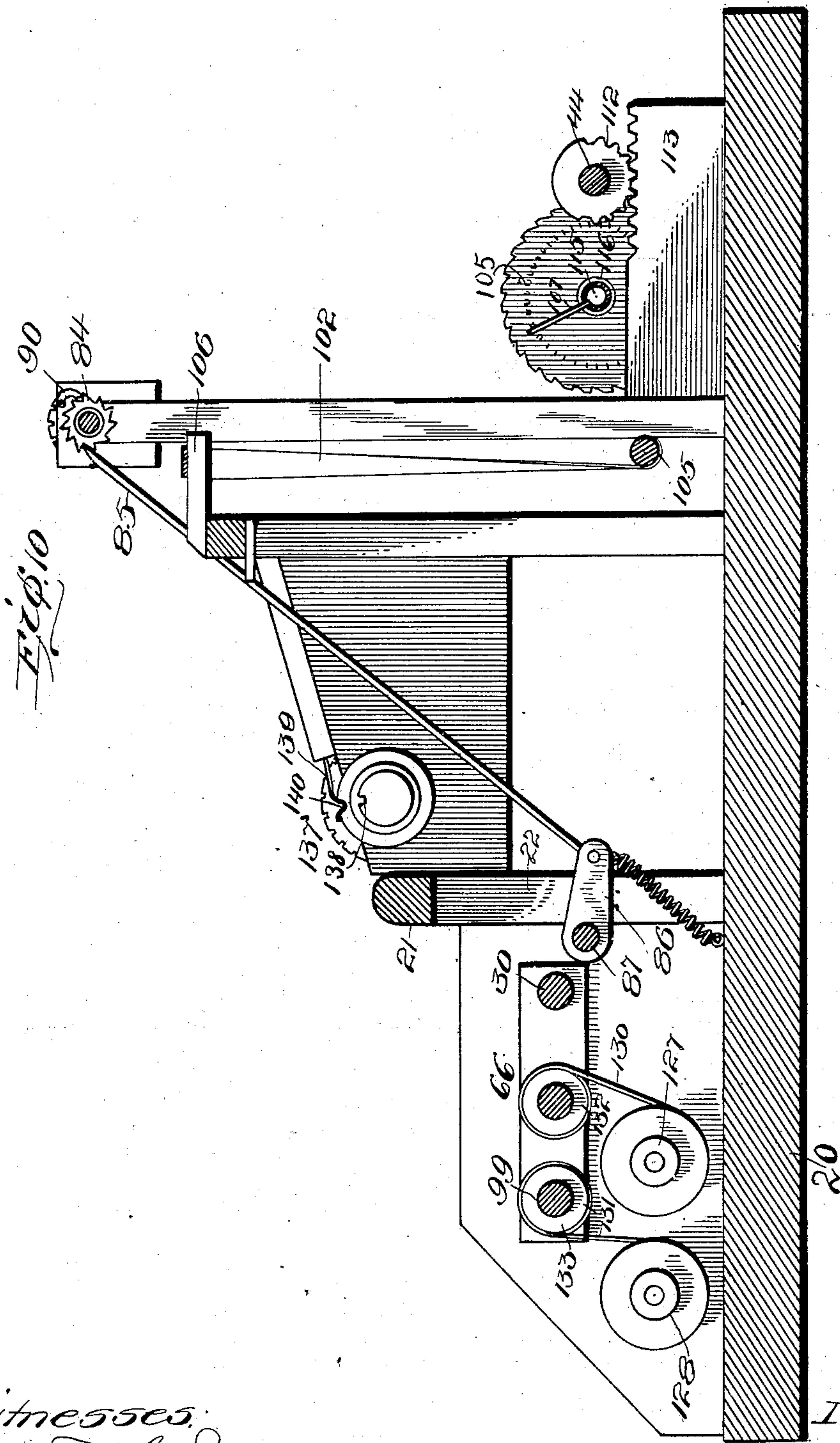
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NO MODEL.

5 SHEETS—SHEET 5.



witnesses:
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UNITED STATES PATENT OFFICE.

ALBERT DE LEAL GILPIN, OF LINCOLN, KANSAS.

ADDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 728,223, dated May 19, 1903.

Application filed July 12, 1902. Serial No. 115,359. (No model.)

To all whom it may concern:

Be it known that I, ALBERT DE LEAL GILPIN, a citizen of the United States, residing at Lincoln, in the county of Lincoln and State of Kansas, have invented a new and useful Improvement in Adding-Machines; and I do hereby declare the following to be a full, clear, and exact description of the same.

This invention relates to machines that are designed to add up columns of figures; and its object is to mechanically add figures, read a line at a time; to indicate to the eye at all times the sum of the numbers that have been added, and to print upon paper each number that is added, as a check against error, also to print the sum of the addition when complete.

To this end my invention consists in the construction and combination of parts forming an adding-machine, hereinafter more fully described, and particularly set forth in the claims, reference being had to the accompanying drawings, in which—

Figure 1 is a top view of an adding-machine according to my invention, the shell or covering of the indicator being removed. Fig. 2 is a side view, partly in longitudinal vertical section, at the irregular line *x* of Fig. 1. Fig. 3 shows the opposite side view of a register-wheel to that shown in Fig. 2. Fig. 4 is a side view of a parting-washer. Fig. 5 is a side view, partly in longitudinal vertical section, at the irregular line *w*, showing a portion of the column-moving mechanism. Fig. 6 is a rear end view of the machine. Fig. 7 is a detail view of a portion of a ribbon-spool and connections. Fig. 8 is an end view of a ribbon-spool and its operating parts. Fig. 9 shows a detail section view of parts at line *Z*, Fig. 2. Fig. 10 represents a longitudinal vertical section at line *y*, Fig. 1. Fig. 11 shows a fragmentary detail of the retarding device.

Numerals 20 represents the frame or body of the machine.

21 represents a pair of rails supported upon posts 22, that are fixed to the frame 20.

23 is a carriage mounted, by means of rollers 24, to travel upon the rails 21.

25 is a toothed rack fixed to the carriage 23 and engaged by a pinion 26, that is fixed on a vertical shaft 27.

28 is another pinion fixed upon shaft 27 and

engaged by a rack 29, that is fitted to reciprocate longitudinally in the frame 20.

30 is a shaft journaled to oscillate in the frame 20 and having fixed upon it a toothed segment 31, that engages with teeth on the rack 29 to reciprocate the rack. The shaft 30 is also provided with a series of arms 32, corresponding in number with the number of columns which this machine is designed to add—say nine or more. For each one of these arms a lever 33 is provided, having a stud 34 projecting from one side to engage the said arm and, further, having a finger-key 35 at its outer end. Each lever 33 is hung upon the shaft 30, with which it connects, by means of a stud 36 in the lever, set close to a stud 37 in the shaft to rock the shaft. I call the keys 35 “column-keys.” Each key is provided with a spring 38 to raise it to its normal position after each depression in being worked. In their normal position of rest the studs 34 and arms 32 are at such distances apart that the whole movement of a lever 33 will turn the shaft 30 a distance corresponding to the column-number of that lever and its key 35. For example, if a line of figures extending to the ten-thousand column is to be inserted the fifth key from the right being pressed down will rock the shaft 30 and segmental gear 31 to slide the rack 29 and rotate the pinions 28 and 26, so as to move the rack 25 and the attached carriage 23 a distance of five column-spaces, thus bringing the fifth column into the line of addition.

36' is a spring-drum communicating with the rack 29 by means of a toothed wheel 37 and straining continually to return the rack to its normal position.

38 is a knob on the shaft of drum 36', by means of which the shaft may be turned to regulate the tension on the spring that is within the drum. On the under side of the rear bar of the carriage 23 is a rack of teeth 39, spaced to correspond with the column-spaces of the machine.

40 is a detent having pawls 41 42 to engage the rack 39 and prevent the carriage from being returned by the action of the spring-drum 36'. The detent 40 is fixed upon a sleeve 43, that is mounted on a shaft 44, that is journaled to rotate in bearings in the frame.

45 is a spiral escapement fixed upon the

sleeve 43 to engage the rack 39, but having spaces between the ends of its segments for the teeth of the rack 39 to pass freely through on its forward movement.

5 46 is a gear-wheel mounted to rotate freely forward upon the sleeve 43, between collars 47 and 48, that are fixed to the sleeve; but it is provided with a pawl 49, which will engage one of two notches in the collar 48 to
10 rotate the sleeve by its return motion. The sleeve in its normal position holds the escapement with an opening between its segments in position for the rack-teeth 39 to pass freely through, and a pawl 41 is held be-
15 tween the teeth of the rack. These pawls 41 42 are impelled outward by springs, so that the one in the path of the rack-teeth will yield for the teeth to pass over it in going forward.

20 52 is a rack engaging the wheel 46 to rotate it. At each return movement of this rack the sleeve 43 is given a half-revolution, which turns the acting pawl 41 out of the path of the rack 39, permitting the carriage to be re-
25 tracted by the spring-drum 36' and its connections; but this retraction is limited to one tooth of space at a time by the spiral escapement 45, being at the same time turned between the next two teeth of the rack 39.

30 53 represents the register, comprising a series of wheels, each having twenty teeth with broad faces marked with the numerals in their order from "0" to "9" and repeated, and mounted to revolve on a shaft 54, that is
35 journaled to rotate in the carriage 23. This shaft is kept in a normally fixed position in the carriage by means of a notched collar 55 and spring-detent 56 to engage the notch. This detent projects from the side of a lever
40 57, that is pivoted to the carriage at 58, and 59 is its spring.

60 is an intermediate wheel toothed to engage the teeth of any one of the register-wheels 53 and mounted to rotate on a shaft
45 61, fixed in the main frame 20.

62 is a toothed wheel also mounted to rotate freely on the shaft 61 and engaged by a rack 63, that slides in the frame 20. The wheel 61 communicates rotary motion in one
50 direction to the wheel 60 by means of a spring-pawl 64; but the return movement of the rack 63 and wheel 61 does not move the wheel 60 backward because of the detent 60'. The rack 63 is provided with another set of teeth,
55 which are engaged by a segment 65, that is rigidly fixed upon a rock-shaft 66 to oscillate with it.

67 represents the digital keys marked with the numerals from "0" to "9" and fitted to
60 slide down in the frame 20 and provided each with a returning-spring 68. The body or stem of each key 67 has rack-teeth on two sides, and one set of these teeth engages a toothed wheel 69, that is mounted to revolve
65 freely upon the shaft 66, but is adapted to engage the shaft by means of a stud 70 on the side of the wheel and a stud 71, project-

ing from the shaft. As in the case of the studs 34 and the arms 32, the studs 70 and 71 are normally such distances apart as will
70 permit all the digit-keys 67 to be pressed down the same distance, and yet each key will move the registry-wheel as many notches as the numeral on that key indicates. It will be understood that all the digit-keys 67
75 act upon the same rock-shaft 66 and that the intermediate wheel 60 transmits to the registry-wheel with which it is then engaged the number of any digit-key that may be struck. If a cipher appeared in the right-hand col-
80 umn through the reading-slot 72 in the cover 73 and digit-key 5 were struck, the register-wheel would be moved along until the tooth with the numeral 5 on it appeared in the slot. Then if key 3 were struck the same
85 wheel would be moved three teeth farther and numeral "8" would appear. Then if key 7 were struck "5" would appear in this column and "1" in the next to make the resultant
90 "15," the carrying mechanism comprising, first, a carrying-wheel 74, having teeth engaging continually the teeth of the next register-wheel 53 to the left and projecting nearly
95 across the space between registry-wheels, and, secondly, a cog 75, on the left-hand face of this wheel, to the right. On a twenty-toothed registry-wheel there are two such
100 cogs 75, each pivoted at 76 to the left face of a register-wheel and located at that tooth which comes into action with the carrying-wheel at the time when a cipher (0) of the
105 right-hand wheel stops under or passes the reading-slot. The cog is pivoted to swing forward if struck by a carrier-wheel tooth coming behind it, and is provided with a spring 141 to return it to place when liberated.

For printing the numbers that are struck to be added and their sum a roll of paper 77
110 is mounted on a shaft 78 in the carriage 23. The end of the paper is passed down under a guide-rod 79 and is kept from falling into the works below by an apron 80. Thence it passes up between a pair of feed-rollers 81
115 82. The roller 82 is a sleeve mounted on a shaft 83, that is journaled in the frame and engaged to roll therewith by means of a slot in the shaft and a pin in the sleeve, which permits endwise sliding of the sleeve on the shaft as the carriage travels.
120

84 is a ratchet-wheel fixed on the end of the shaft-83, and 85 is a pawl hung upon an arm 86 of the rock-shaft 87.

90 is a spring-detent for holding the ratchet-wheel 84 as the pawl 85 sets it.
125

91 is a wheel having types 92 projecting radially from its edge, the types being numerals from "0" to "9." This wheel is fixed upon a shaft 93, on which is a pinion 94, that engages rack-teeth in the side of rack-bar 63.
130

95 is a bail-shaped hammer hung upon a rock-shaft 96 to strike against the back of the paper 77 opposite to the type 92 by rocking of the shaft 96, that is journaled in the

frame 20, and is provided with a short arm 97, which is acted upon by a lug 98 on the side of rack-bar 52.

99 is a rock-shaft journaled in the frame 20 and having a series of toothed wheels 100 mounted to rotate on it, one for each numeral-key 67, and engaging a rack on the body of the key opposite to the wheel 69.

101 is a toothed segment fixed upon the shaft 99 and engaging teeth on rack-bar 52.

102 is the inking-ribbon, wound on spools 103 and 104 and running under guide-bars 105, thence up over guide-bars 106 to the level of the type 92, where it extends across the machine between the bars 106 and is twisted into a vertical plane by vertically-slotted guides 107, which guide it directly between the type and the paper. A pinion 108, Figs. 5 and 6, fixed upon the shaft 44, is engaged by the rack 109, which is operated by a toothed segment 110, that is fixed to rock with the shaft 87. Two pinions 112 are also fixed upon the shaft 44 to engage racks 113, and these racks are provided with pawls 114 to engage teeth on the spools 103 and 104. These spools have teeth 105 projecting in circles from their adjacent faces to be engaged by spring-arms 106 and 107, respectively, which act as frictional detents on the spools. These arms project from the shaft 115, which is fixed in the frame, and the two spools are mounted each between collars 118, Fig. 7, to rotate upon a sleeve or hollow shaft 116, which is fitted to slide longitudinally upon the shaft 115.

117 is a spring fixed at one end upon the sleeve 116 and adapted to frictionally engage a nib 119 on the shaft, whereby the sleeve is held when set with either spool engaging its detent 106 or 107 and its propelling-pawl 114.

120 represents two leaves, one pivoted to the frame at the outer end of each spool to act against dogs 123 on the same, and 121 and 122 are cams mounted on shaft 44 to act against the leaves, whereby the spools and their sleeve will be shifted first to one end and then to the other end of the shaft 115. When at the end, as shown, the spool 104 will be operated by the rack 113 and pawl 114 to wind the ribbon onto it from spool 103, and when at the other end the action will be reversed and spool 103 will do the winding from spool 104. The dogs 123 on the face of each spool 103 104 are pivoted at 124 near the shaft and provided each with an arm 125, which extends through a slot in the spool-head, and all but two or three turns of the ribbon are wound over it, holding the dog above the level of leaf 120. When the ribbon is wound off from one spool until this dog is liberated, it swings on its pivot 124 down between the leaf 120 and the spool. Then the next time that shaft 44 is operated the cam 121 in swinging the adjacent leaf 120 will press against that dog 123 and shift the spools to the opposite end of their shaft. Then the other rack

113 will be engaged with the emptied spool and begin rewinding the ribbon onto it.

126 represents springs that return the leaves 120 to their normal vertical positions. They are both operated by their cams 121 and 122 every time the shaft 44 is operated; but they have no effect upon the spools until one, becoming nearly empty, drops its dog 123 into the path of one of the leaves. Then the spools are shifted, as above described.

127 and 128 are knobs attached to the spindles of springs that are wound on the spindles to return the shafts 66 and 99, respectively, to their normal positions after service by means of bands 130 and 131, connecting the spring-drums with wheels 132 and 133 on the shafts. Pawls 134 and 135, acting upon ratchet-wheels 136 137, serve to retain the shafts with the springs wound to the tension required.

137' represents a turnbuckle journaled to revolve in the frame 20 in line of the register-shaft 54 and bored centrally to receive the shaft and provided with a tongue 138 to engage the groove in the shaft.

139 is a spring fixed in the frame and having a nib 140 to engage a single notch in the turnbuckle, whereby the turnbuckle is held with its tongue normally in line of the groove in the shaft 54, yet permitting the turnbuckle to be rotated when a little force is applied by thumb and finger. This is done when the carriage is at the left-hand end of its path and the shaft 54 is in the turnbuckle for the purpose of bringing all the registry-wheels to the starting-point, showing "0" on each in the reading-slot. To accomplish this, rotate the turnbuckle one complete revolution. That turns shaft 54 and engages its slot with one of the two pawls 142 of each register-wheel 53 and turns it forward, and when wheel 55 comes around to again receive the detent 56 the shaft will have picked up the registry-wheels from all points where they may have been located circumferentially and have carried them all to the "0" point. To prevent frictional moving of the registry-wheels by the shaft when thus turned, the lever 57 when raised by the detent 56 being pushed up out of its notch in wheel 55 acts against an arm 143 of a rock-shaft 144. This rock-shaft is journaled in the carriage 23 and carries a series of springs 145, one to bear frictionally upon each carrying-wheel 74, and the carrying-wheels being always in gear with the register-wheels 53 they hold the said registry-wheels stationary until one of the pawls 142 of each of the latter is engaged by the shaft 54, and each wheel is positively propelled to place. To hold the registry-wheels at the right while adding is being done on the machine, a blade 146 is supported rigidly upon a portion of the frame 20, with its left-hand end close beside the intermediate drive-wheel 60 and with its edge in line of a line of notches between teeth on the registry-wheels 53, so

that when the carriage is moved to the right it will enter said line of notches and hold those wheels from revolving.

The operation is as follows: Let us suppose
 5 that the first line of figures to be inserted is "6475." Now if the fourth column-key 35 be pressed down its stud 34 will carry down the arm 32 of shaft 30 and rock that shaft, with the segment 31, and slide the rack 29,
 10 Fig. 2, to rotate the pinion 28, shaft 27, and pinion 26, whereby the rack 25 and the carriage 23 will be moved to the right four spaces, bringing the register-wheel 53 of the fourth column into engagement with the in-
 15 termediate wheel 60. The carriage is retained in this position by pawl 41, Fig. 6. Now if the key 6 of numeral-key 67 be pressed down the shaft 66 and the segment 65 will be rocked to slide the rack 63, partially rotating the wheel
 20 61, and with it the wheel 60, which rotates the said fourth column-wheel 53 sufficiently to bring its numeral "6" into the reading-line. The rack 63 also acts upon the pinion 94, Fig. 2, to revolve the shaft 93 and type-wheel
 25 91 and bring type-numeral "6" opposite to the ribbon 102 and paper 77, at which time the hammer 95 strikes the paper against the ribbon and that against the type, whereby the numeral "6" is printed on the paper.
 30 The hammer-blow is caused thus: When the key 6 is depressed, it acts, through pinion 100, Fig. 2, shaft 99, segment 101, rack 52, its lug 98, and the arm 97, to rock the shaft 96, and with it the hammer 95, that is hung
 35 thereon, to strike the blow. The rack 52 being also engaged with pinion 46 and its forward movement being to the left it rotates the sleeve 43 on its return movement, and with it the detents 41 and 42 and the escape-
 40 ment 45, permitting the carriage 23 to be retracted one column-space by the spring-drum 36, Fig. 6, acting through its gear-wheel 37, rack 29, and pinions 28 and 26, Fig. 2, on rack 25 of the said carriage 23. This brings
 45 registry-wheel 3 in line for work and also brings the paper along ready to receive the next column-figure. Now by pressing down the numeral-key 4 the shaft 66 will be rotated the requisite amount to operate the interme-
 50 diate wheel 60, as before described, and with it the registry-wheel for column 3, to bring numeral "4" into the reading-slot, and at the same time it will operate the printing-wheel and the escapement, so that "6" and
 55 "4" now appear in the thousands and hundreds columns, respectively, of the register and have been so printed on paper, and the carriage is permitted to move for the tens-column, where the numeral "7" is to be in-
 60 serted, after which the carriage moves to the units-column, where the numeral "5" is to be inserted. Thus far there has been no addition. A line of numerals has been merely inserted in the reading-slot of the registry-
 65 wheels and upon the paper. Now if we insert another line of numerals—"576," for example—the result will be, first, that the third

key 35 is to be pressed down, moving the carriage to the right and bringing the third or
 hundreds column registry-wheel into engage- 70
 ment with wheel 60. The column-key 35 also acts through rock-shaft 87, Fig. 5, segment 110, rack 109, pinion 108, shaft 44, rack 113, and pawl 114 to feed the ribbon, and
 through arm 86, Fig. 10, pawl 85, ratchet 75
 84, and roller 82 to raise the paper a line at a time. Now press down numeral-key 5, and this registry-wheel being moved
 along five numbers from the "4," where it stood, will indicate "9" in the reading-slot, 80
 but will print "5" in the hundreds-column on the paper, and the carriage will be moved to the left one column-space, as before de-
 scribed. Now by pressing down the numeral-
 key 7 the tens registry-wheel, which was set- 85
 ting at "7," will be rotated forward seven teeth more and bring numeral "4" into the reading-slot and print the "7" on the paper.
 At the same time it passed the "0" point, and one of the cogs 75 on this registry-wheel 90
 engaged a tooth of the carrying-wheel 74 for the thousands-column and moved it forward one tooth, and as that column stood at "9" this would leave a cipher ("0") in the thou-
 sands-column, and the cog 75 of that wheel 95
 would move the carrying-wheel of the tens-of-thousands column one tooth, thus adding one to the "6" already there and leaving the sum
 thus far indicated "704." Now if the "5" in the units-column be added to the "6" al- 100
 ready there one will be carried to the tens-column, and the sum will appear on the registry-wheels in the reading-slot as "7051," yet only the numerals "6475" and "676" of
 the lines inserted will be printed on the pa- 105
 per. Thus any number of lines of numerals may be recorded on paper and their sum be at the same time indicated to the eye in the reading-slot. The left-hand-column key
 marked "Space" is connected with the shaft 110
 87 to move the ribbon and to elevate the paper; but it is not connected, like the other column-keys, with shaft 30 to move the carriage. So by pressing this space-key the pa-
 per will be raised one or more lines. Then 115
 the sum of the addition which is seen in the reading-slot may be printed as before described for other lines, and the doubling of the sum that appears in the reading-slot is of no moment. All numbers being written from 120
 left to right, the carriage is now at the left, the addition being completed, and the shaft 54 is in the turnbuckle 137, and if that be rotated one revolution it will restore all the
 registry-wheels to their "0" or starting 125
 point.

This machine is well adapted to balancing bank-book accounts, as it prints the amount of each check added, and its entries can be readily compared at any future time with the 130
 original figures as a check against error. By adding a full line of numerals at a time and indicating the sum at every line this machine enables the operator to leave his work at any

moment, and by making a memorandum of the sum thus far indicated if on his return he discovers that the machine has been tampered with in his absence he can start again with his memorandum for the first line without loss of the labor done and without error.

Having thus fully described my invention, what I believe to be new, and desire to secure by Letters Patent, is the following:

10 1. In adding-machines, a frame, a carriage mounted to reciprocate thereon; a series of register-wheels mounted to rotate upon a shaft in the carriage and provided with teeth numbered from "0" to "9;" an intermediate drive-wheel journaled in the frame to engage any one of the said register-wheels; a toothed rack fixed to the carriage; a toothed rack fitted to reciprocate in the frame; a shaft and pinions communicating between the said
20 two racks; a shaft mounted to rock in the frame and provided with a toothed segment to engage the said reciprocating rack, and further provided with a series of radial arms, and column key and lever for each of the said
25 registry-wheels, each of the levers having a stud on its side for engaging one of the said arms and normally located at a distance from the arm corresponding with the column-number of the key, as described.

30 2. In adding-machines, a series of register-wheels, each having teeth marked from "0" to "9;" a series of finger-keys marked from "0" to "9;" a shaft common to all the keys and having a radial stud for each key; a
35 toothed rack upon the stem of each key and a pinion engaging each rack and free to rotate on said shaft, and a stud projecting from the side of each pinion to engage a stud on the shaft, the distances between engaging
40 studs being graded in a fixed relation to the numerals of the respective keys, and means for communicating motion from the shaft to the register-wheels, substantially as described.

45 3. In adding-machines, a frame; a series of numeral-keys having toothed racks on their stems; a shaft journaled to rock in the frame and provided with pinions to engage the said toothed racks; a toothed segment upon the
50 said shaft; a carriage mounted to reciprocate on the frame; a series of toothed register-wheels journaled on a shaft in the carriage; an intermediate wheel in the frame to engage any one of the register-wheels; a pinion
55 mounted beside the said intermediate wheel to rotate freely on the same shaft; a rack for communicating between this pinion and the aforesaid toothed segment, and a spring-pawl communicating between the said pinion and
60 intermediate wheel, substantially as described.

4. In adding-machines, a frame; a carriage mounted to reciprocate thereon; a series of toothed register-wheels mounted on a shaft
65 in the carriage; an intermediate wheel in the frame to engage either of the register-wheels;

a blade fixed to the frame in line with a line of notches between teeth of the register-wheels, with one end close beside the said intermediate wheel, and means for operating the
70 parts, substantially as described.

5. In adding-machines, a series of register-wheels mounted freely on a shaft; a notched collar fixed to the shaft; a series of carrying-wheels engaging the register-wheels; a rock-
75 shaft provided with a series of tension-springs, one to bear upon each carrying-wheel; a lever provided with a detent for engaging the said notched collar, and an arm on the said rock-shaft engaging the said lever, substan-
80 tially as described.

6. In adding-machines, a frame; a carriage thereon; a series of register-wheels mounted on a shaft in the carriage; a series of numeral-keys; a single shaft journaled in the frame
85 and having moving communication with each key proportional in amount to the numeral on the key, and a toothed segment attached to the shaft; a series of register-wheels mounted on a shaft in the carriage; paper mounted
90 to be carried on the carriage; an ink-ribbon carried in front of the paper; a wheel provided with type-numerals from "0" to "9;" a rack-bar communicating motion from the said toothed segment to the register-wheels
95 and to the type-wheel, and a hammer arranged to strike the paper against the ribbon and type, substantially as described.

7. In adding-machines, a frame; a carriage thereon; a series of register-wheels, and record-paper mounted on the carriage; an intermediate wheel mounted on the frame to engage either of the register-wheels; a wheel
100 mounted on a shaft in the frame and provided with type-numerals; a rack-bar engaging the said intermediate wheel and type-wheel, and means for reciprocating the rack-bar and the carriage, substantially as described.

8. In adding-machines, a frame; a carriage
110 thereon; register-wheels journaled in the carriage; paper-supporting devices in the carriage; a rock-shaft journaled in the frame and having a radial arm; column-spacing levers connected with the said rock-shaft; rollers
115 mounted in the carriage for feeding the paper, one of the said rollers being a sleeve fitted to slide upon a shaft journaled in the frame; a ratchet-wheel upon the said shaft, and a pawl connected with the aforesaid radial arm, substantially as described, whereby
120 the paper will be fed a line every time a column-spacing key is operated.

9. In adding-machines, a frame; a carriage thereon; paper-roll-supporting devices and
125 paper-guiding devices in the carriage; a pair of feed-rollers in the carriage for the paper; a shaft journaled in the frame, and feed-operating mechanism for the said shaft; one of the feed-rollers of the said pair being mounted
130 as a sleeve to rotate with and to slide longitudinally upon the said shaft, mechanism

for adding figures and mechanism for printing upon said paper the figures added, substantially as described.

10. In adding-machines, a frame; a paper-carrying carriage; a type-wheel journaled in the frame; a bail-shaped hammer hung to the frame at each side of and below the carriage and extending above and across over the carriage and paper and provided with a face for striking the back of the paper opposite to the said type-wheel, substantially as described.

11. In adding-machines, a frame; a carriage thereon; a series of register-wheels journaled in the carriage; a series of numeral-keys hung in the frame; a toothed rack upon the carriage, and a detent-escapement therefor, comprising a shaft journaled in the frame; a sleeve to revolve on the shaft, a spiral escapement and a detent with spring-pawls fixed upon the sleeve; the said escapement and pawls being arranged to engage alternately the teeth of the said rack; a pinion upon the sleeve; a rack-bar communicating from the said numeral-keys to the said register-wheels, and another rack-bar communicating from the same keys to the said pinion on the escapement-sleeve, substantially as described.

12. In adding-machines, a frame; a carriage for carrying paper and mechanism for adding figures and for printing the same upon the said paper, provided with a toothed rack and means for retracting it; a shaft in the frame parallel with the said rack; a detent upon the shaft having one or more pawls to engage the said rack; a segmental spiral escapement to engage the rack alternately with the said pawls, and means for rotating the shaft, substantially as described.

13. In adding-machines, a frame; a carriage for carrying paper provided with a rack of teeth and means for retracting it; a rotary shaft; a detent thereon having a spring-pawl to engage the teeth of the rack and an escapement on the shaft engaging the teeth alternately with the said pawl, and mechanism for adding figures and for printing the figures on the said paper, substantially as described.

14. In an adding-machine, a frame; a carriage thereon; a series of register-wheels journaled in the carriage; a toothed rack on the carriage; means for retracting the carriage and an escapement engaging the rack to resist it; a series of numeral-keys, each provided with a stem having two racks of teeth upon it; two rock-shafts journaled in the frame, one at each side of the line of key-stems; a pinion on each shaft engaging a rack on each key-stem; a toothed segment also on each shaft, and a rack for each segment; one of the racks communicating with the said register-wheels and the other rack communicating with the said escapement, substantially as described, whereby the pressing of a numeral-key operates a register-wheel and the return of the key operates the escapement.

15. In an adding-machine, a frame; a car-

riage thereon; register-wheels in the carriage; retracting means and an escapement for the carriage; a line of numeral-keys in the frame, each key being provided with two toothed racks on its stem, and means communicating between one of these racks and the register-wheels, and means communicating between the other rack and the escapement, substantially as described.

16. In adding-machines, a frame; a carriage thereon; a series of register-wheels, each for adding a separate column of figures; two shafts journaled in the frame; a series of column-spacing keys hung upon one of the said shafts, and means communicating between each of these keys and each of the said shafts; a toothed segment upon each shaft; a rack-bar for each segment; a feed-rack upon the carriage; a pinion communicating between this feed-rack and one of the said rack-bars; a carriage-retracting spring connected with the last-named rack-bar; two circumferentially-toothed ribbon-spools upon a shaft journaled in the frame; another shaft journaled parallel with the spool-shaft and provided with a pinion near each spool, also with a pinion in line of one of the aforesaid segments; a rack-bar communicating between the said segment and the last-named pinion; a rack engaged by each of the two pinions near the spools, and a pawl upon each of these racks fitted to engage the spools, respectively, substantially as described.

17. In adding-machines, a frame; a carriage thereon; mechanism for adding figures; means for carrying paper and type for printing the said figures thereon; a shaft fixed to the frame, and a hollow shaft mounted to slide thereon; the hollow shaft being slotted and provided with a detent-spring extending over the slot, and the fixed shaft having a nib projecting through the slot to be engaged by the said spring; a ribbon-spool mounted between collars to rotate freely upon each end of the hollow shaft; each spool being circumferentially toothed; a propelling-pawl for each spool, and means for shifting the said hollow shaft from end to end whereby first one spool and then the other will be engaged with its propelling-pawl, substantially as described.

18. In adding-machines, mechanism for adding figures, a printing device adapted to print the said figures comprising an inking-ribbon; a fixed shaft; a hollow shaft fitted to slide longitudinally thereon; a ribbon-spool mounted to revolve freely on each end of the hollow shaft; each spool being provided with circumferential teeth and with a like number of teeth in a circle on one of its sides; pawls to engage each spool alternately by its circumferential teeth; spring-detents projecting from the fixed shaft through slots in the hollow shaft to engage the spools alternately; and means for shifting the hollow shaft and the spools thereon from end to end to establish such engagement, substantially as described.

19. In adding-machines, mechanism for adding figures; a frame; a printing device adapted to print the said figures comprising an inking-ribbon; two ribbon-spools mounted to rotate freely upon the two ends of a shaft that is fitted to slide longitudinally on supports in the frame; a dog pivoted at one end to the outer face of each spool near its shaft, and provided at the other end with an arm extending through a slot in the end of the spool into the ribbon-space; a leaf pivoted at one edge to the frame and held by a spring standing normally parallel with the end of the spool and just beyond the rotary path of the said dog; a drive-shaft journaled in the frame parallel with the spool-shaft; a cam on each end of the drive-shaft fitted to engage the said leaves, and means for rotating the drive-shaft, substantially as described.

20. In adding-machines, mechanism for adding figures; a frame; a printing device adapted to print said figures comprising an inking-ribbon; two spools mounted on a shaft for rotary and endwise motion; two leaves pivoted to the frame just beyond the path of the endwise movement of the spools; a shaft journaled in the frame parallel with the spool-shaft; cams upon the end of the drive-shaft to engage the said leaves, and means communicating between the leaves and spools, substantially as described.

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

ALBERT DE LEAL GILPIN.

Witnesses:

M. P. KING,
W. B. MCBRIDE.