

No. 858,626.

PATENTED JULY 2, 1907.

R. VON REPERT.
ADDING MACHINE.

APPLICATION FILED NOV. 13, 1905.

9 SHEETS—SHEET 1.

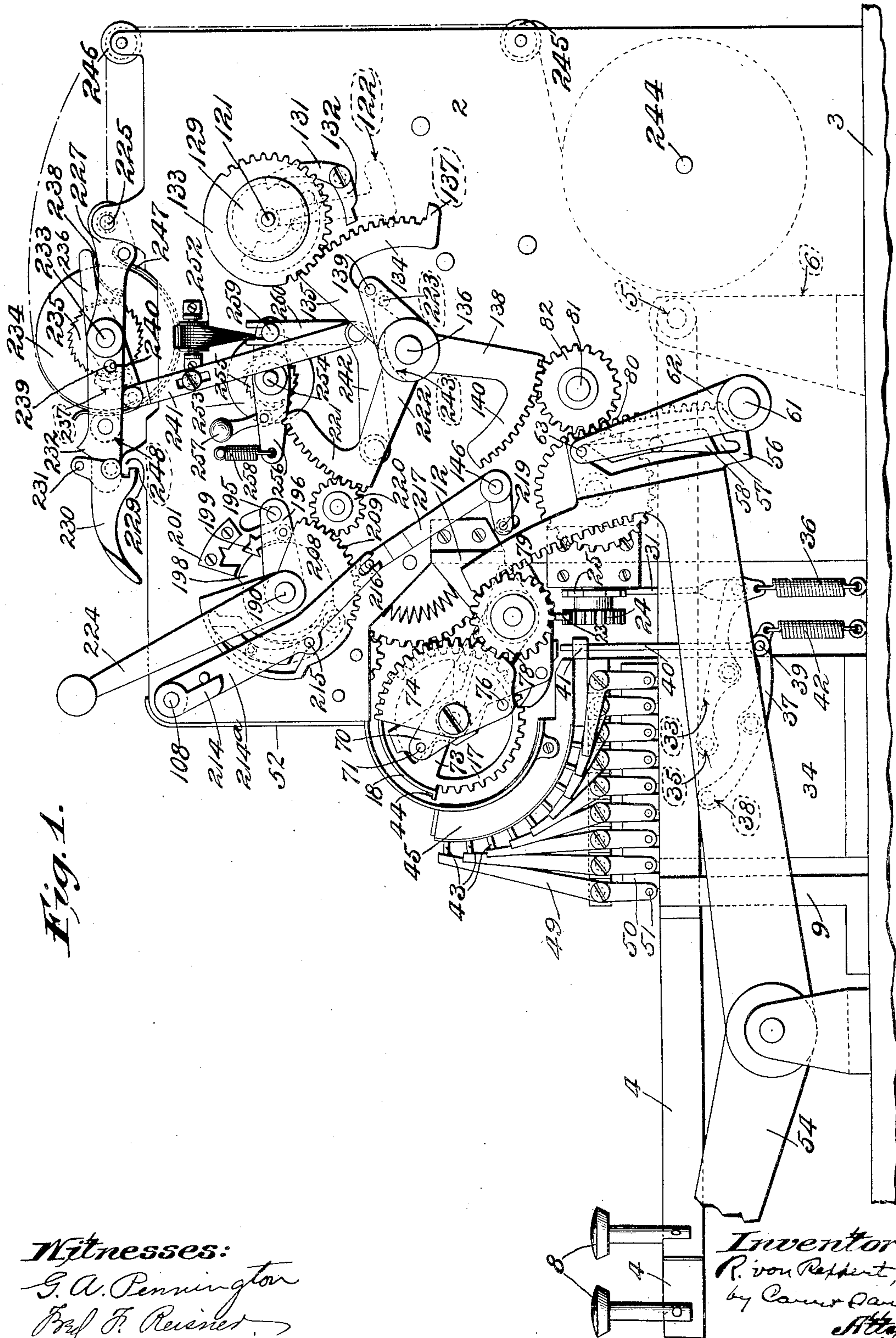


Fig. 1.

Witnesses:

G. A. Pennington
Paul H. Reiser

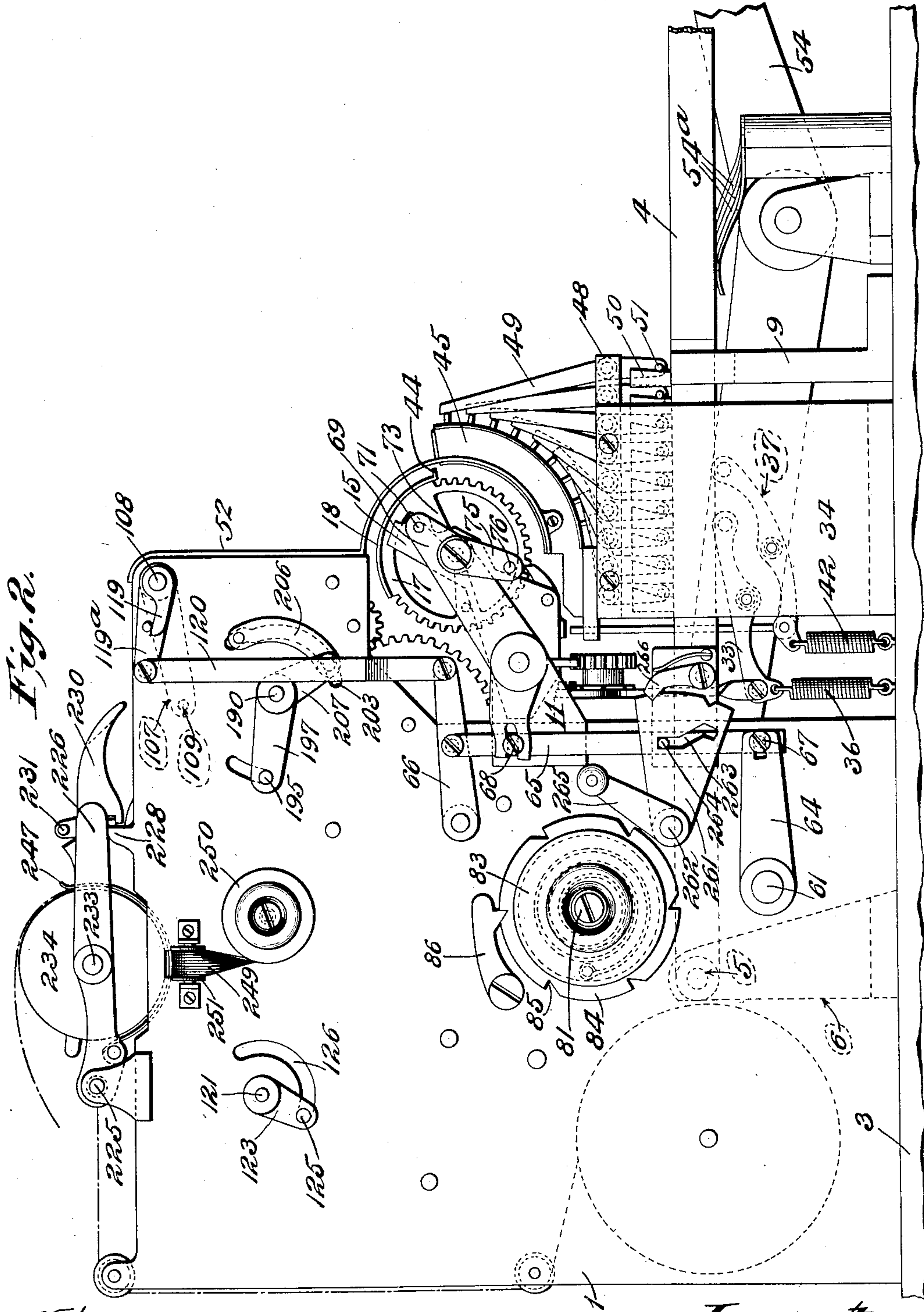
Inventor:
R. von Reppert,
by Camer Danc,
Attys.

No. 858,626.

PATENTED JULY 2, 1907.

R. VON REPERT.
ADDING MACHINE.
APPLICATION FILED NOV. 13, 1905.

9 SHEETS—SHEET 2.



Witnesses:
G. A. Pennington
Fred J. Reunert

Inventor:
R. von Reppert,
By *Carroll Davis*,
Attys.

No. 858,626.

PATENTED JULY 2, 1907.

R. VON REPPERT.
ADDING MACHINE.

APPLICATION FILED NOV. 13, 1905.

9 SHEETS—SHEET 3.

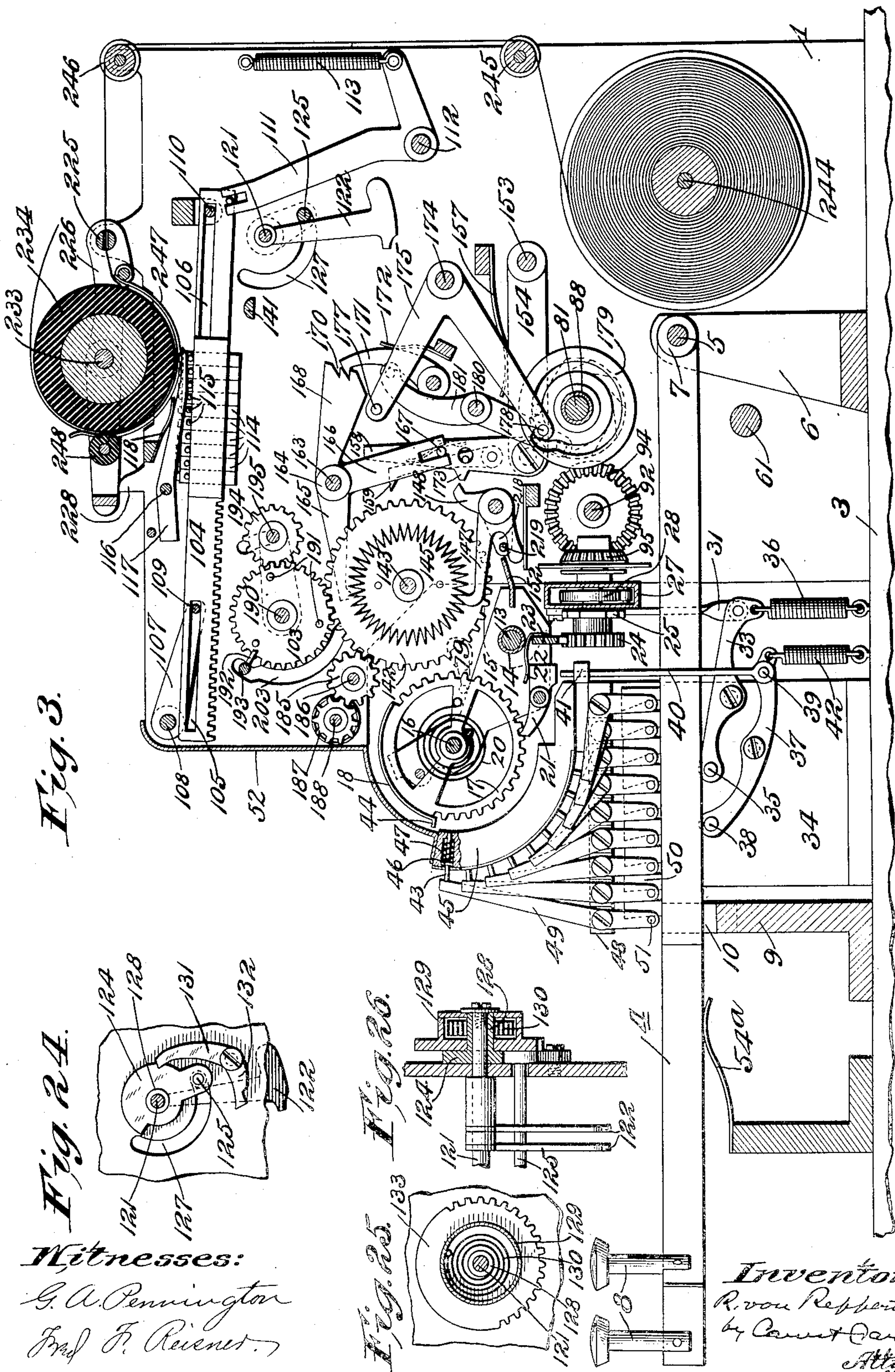


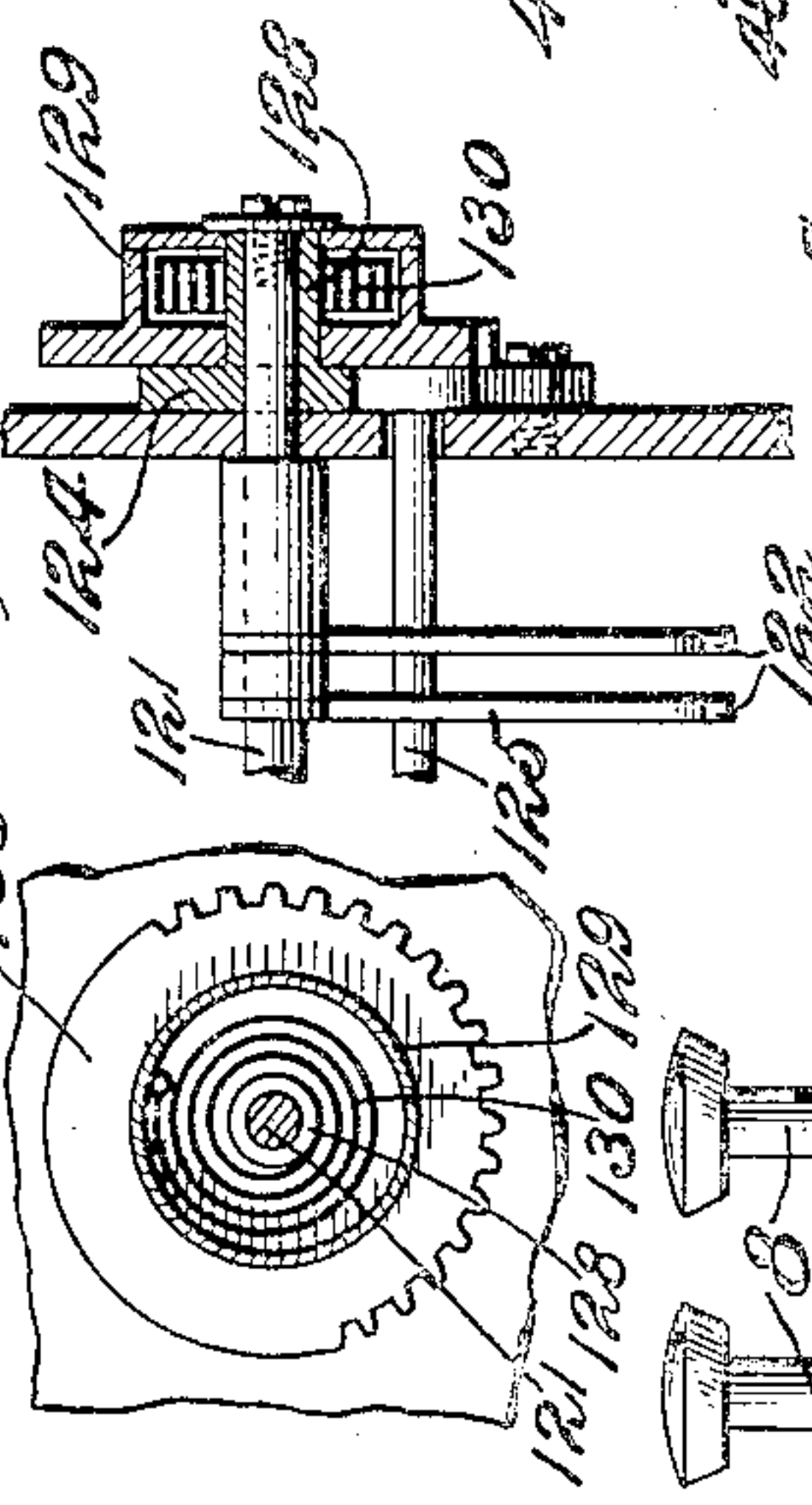
Fig. 3.

Fig. 24.

Witnesses:

G. A. Pennington
Fred F. Reiser.

Fig. 25.

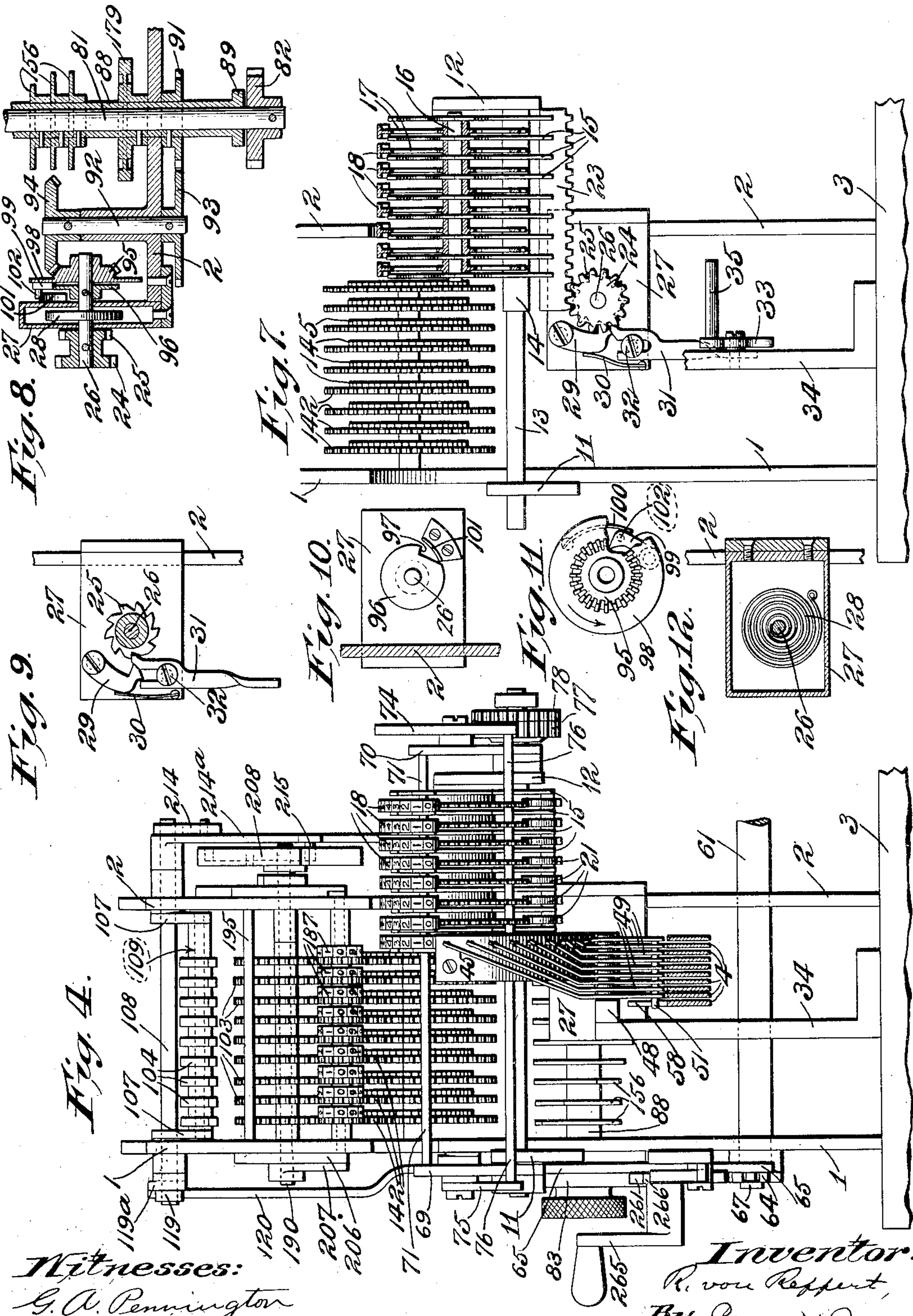


Inventor:
R. von Reppert,
by Carver & Co.,
Attys.

R. VON REPERT.
ADDING MACHINE.

APPLICATION FILED NOV. 13, 1905.

9 SHEETS—SHEET 4.



Witnesses:
G. A. Pennington
Fred F. Reimer

Inventor:
R. von Reppert,
By *Carroll Carr*
Attys.

No. 858,626.

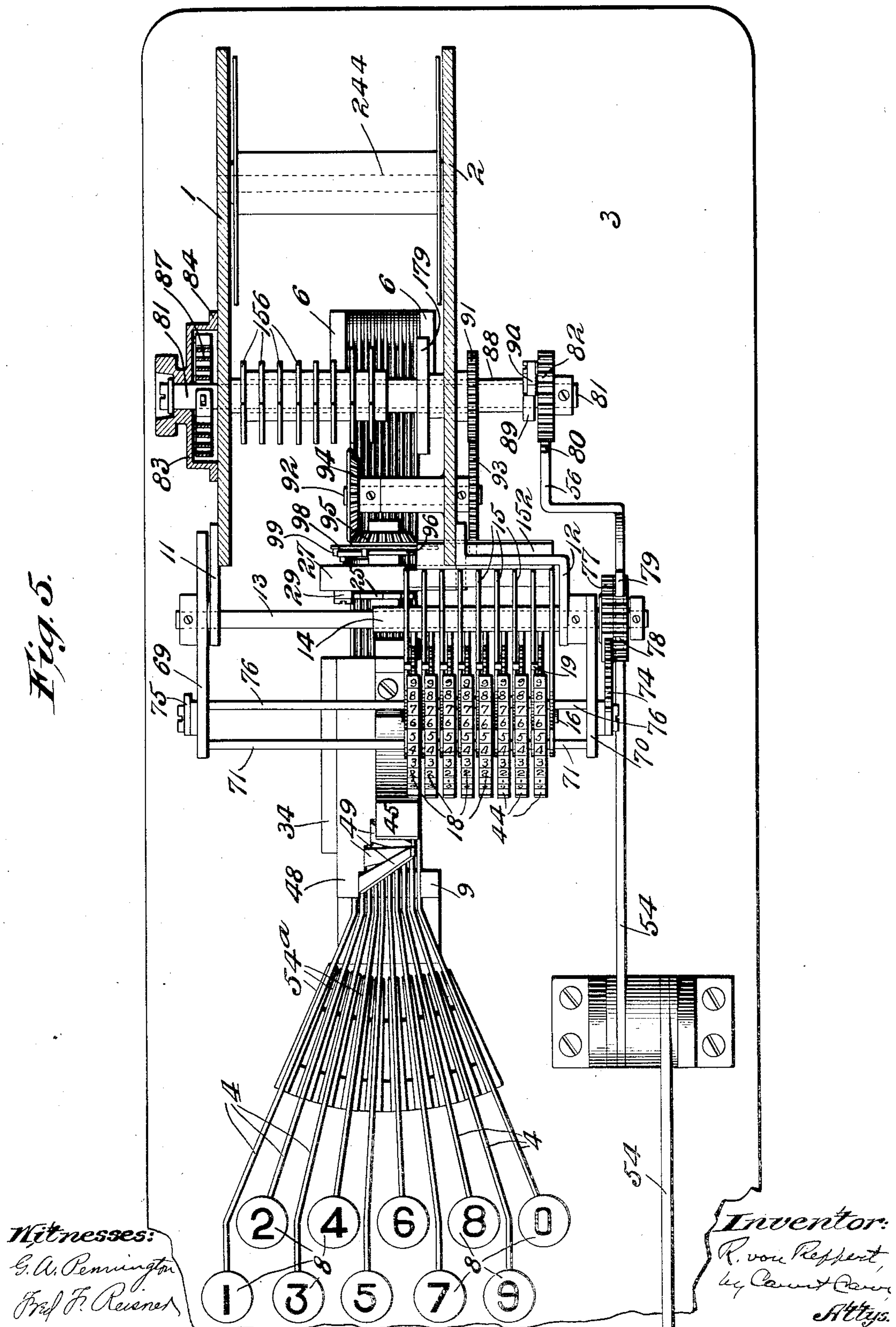
PATENTED JULY 2, 1907.

R. VON REPPERT.
ADDING MACHINE.

APPLICATION FILED NOV. 13, 1905.

9 SHEETS—SHEET 5.

Fig. 5.



No. 858,626.

PATENTED JULY 2, 1907.

R. VON REPERT.
ADDING MACHINE.

APPLICATION FILED NOV. 13, 1905.

9 SHEETS—SHEET 6.

Fig. 6.

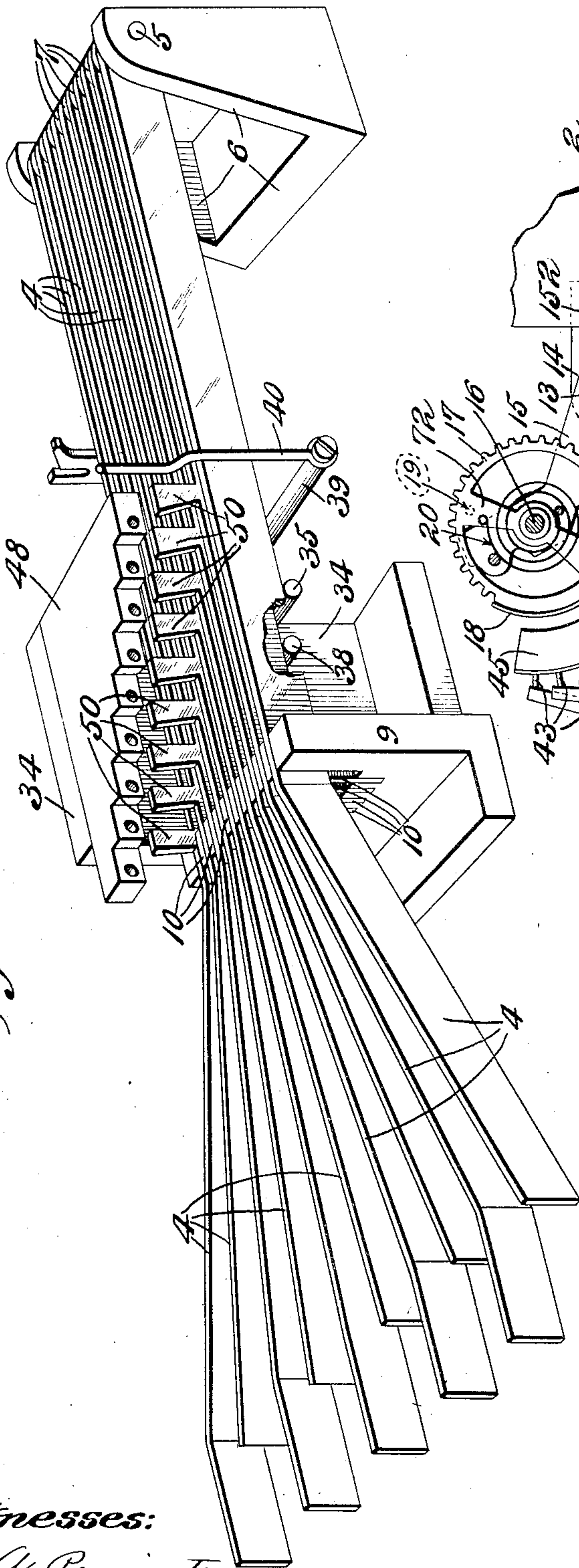
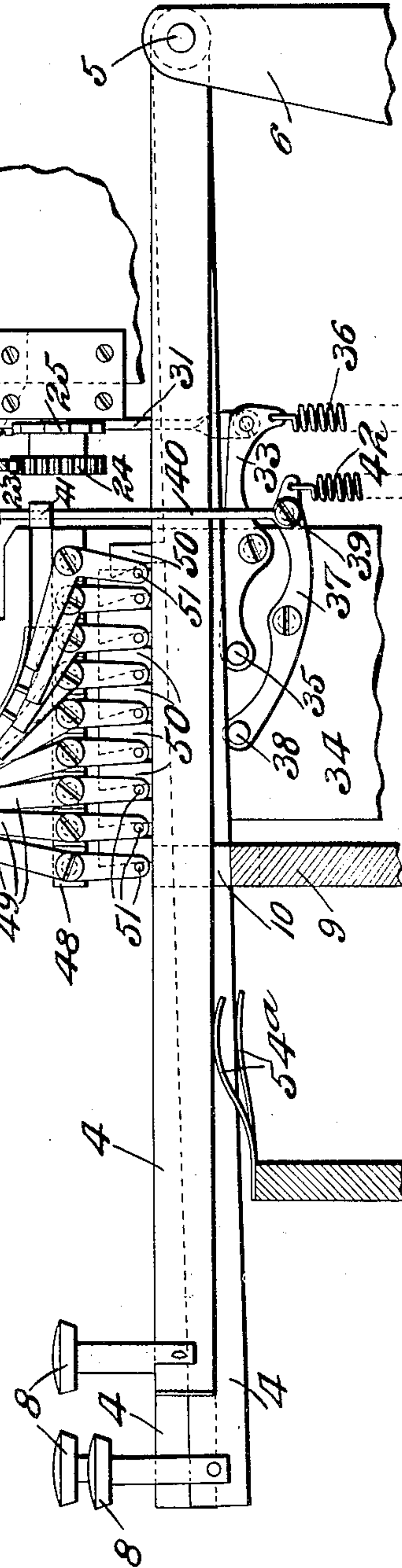


Fig. 13.



Witnesses:

G. A. Pennington
Fred F. Reiser.

Inventor:
R. von Reppert,
By Cant & Cant,
Attys.

R. VON REPPERT.
ADDING MACHINE.

APPLICATION FILED NOV. 13, 1905.

9 SHEETS—SHEET 7.

Fig. 14.

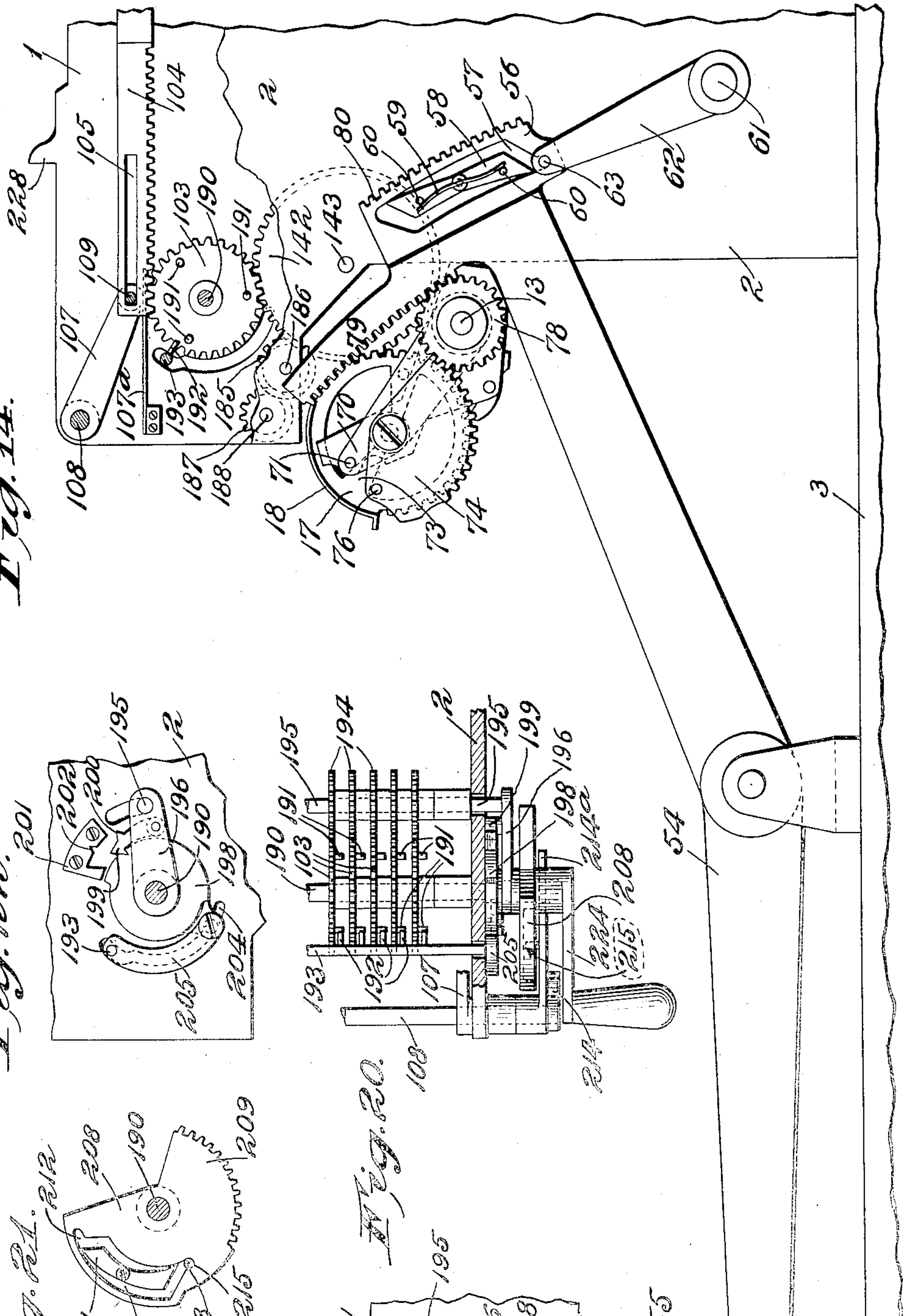


Fig. 22.

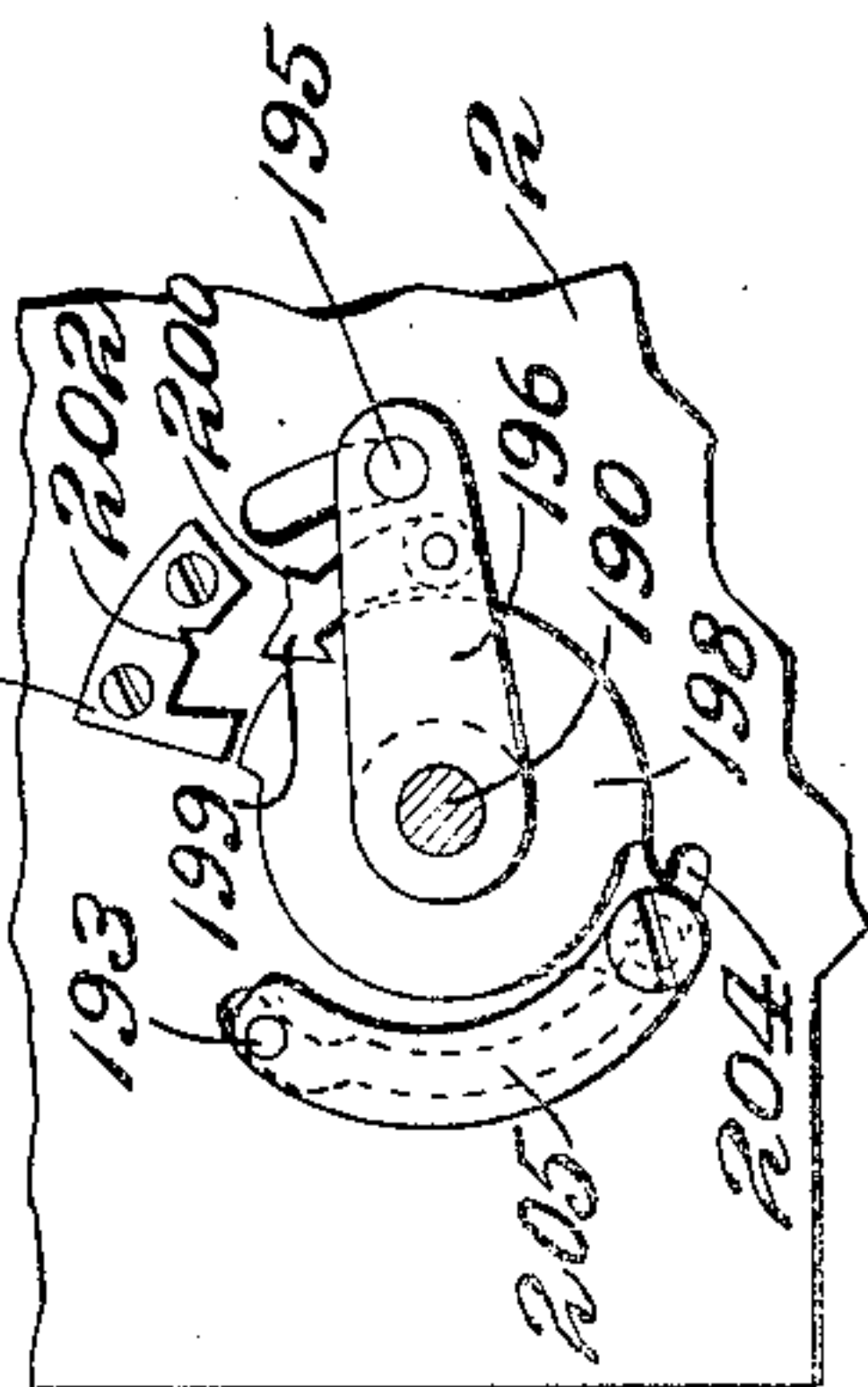
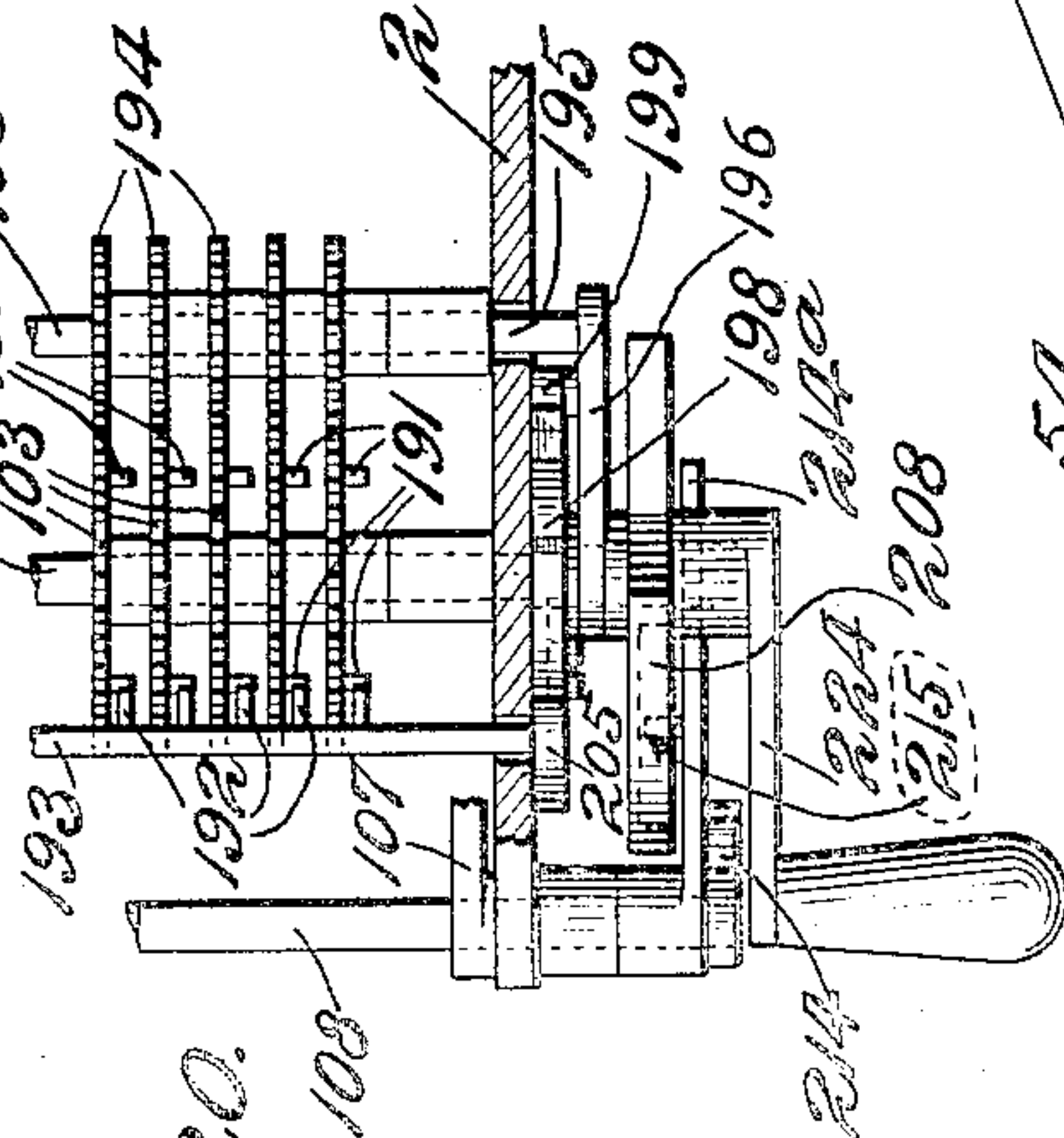


Fig. 20.



R. VON REPPERT.
ADDING MACHINE.

APPLICATION FILED NOV. 13, 1905.

9 SHEETS—SHEET 8.

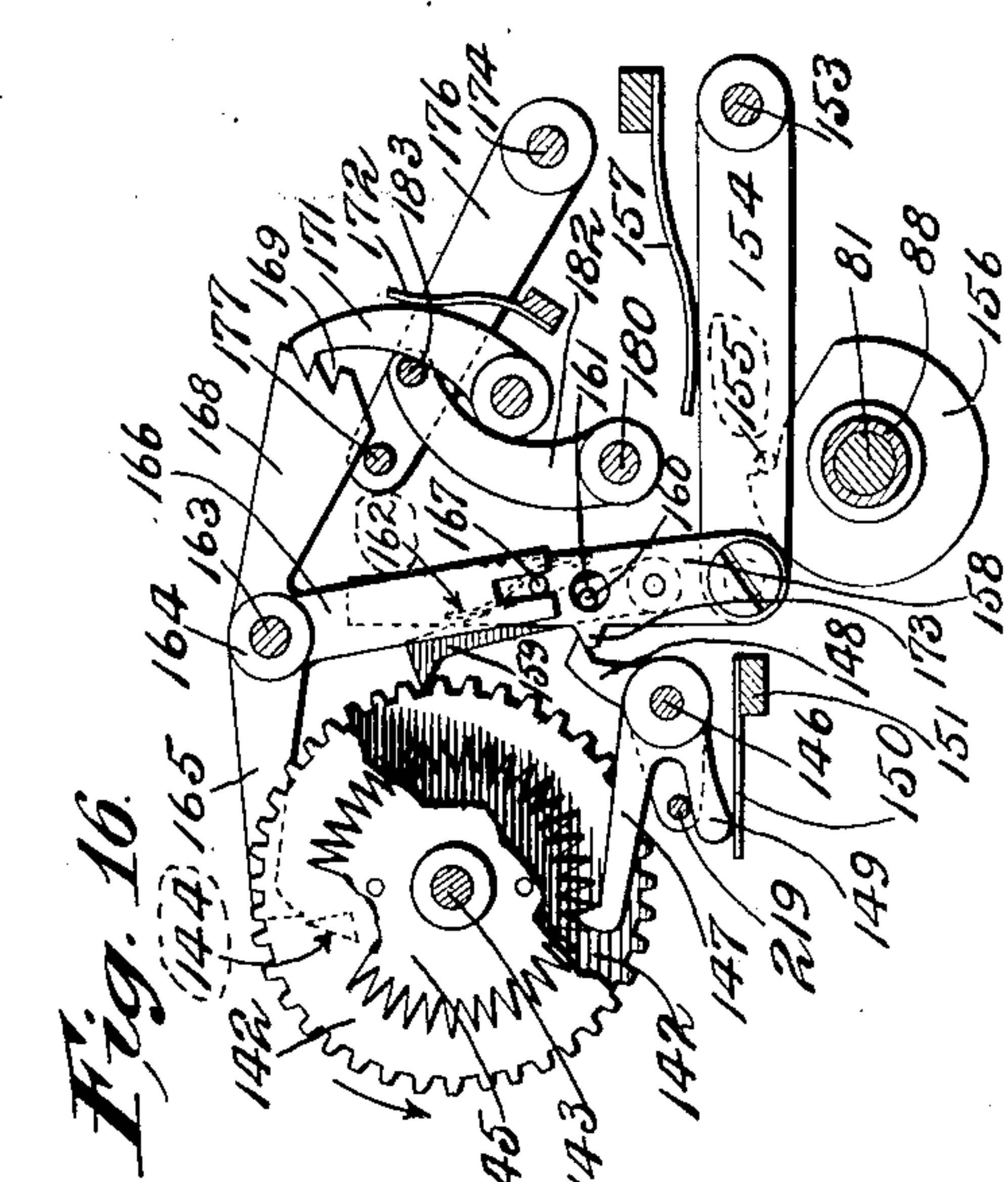


Fig. 16.

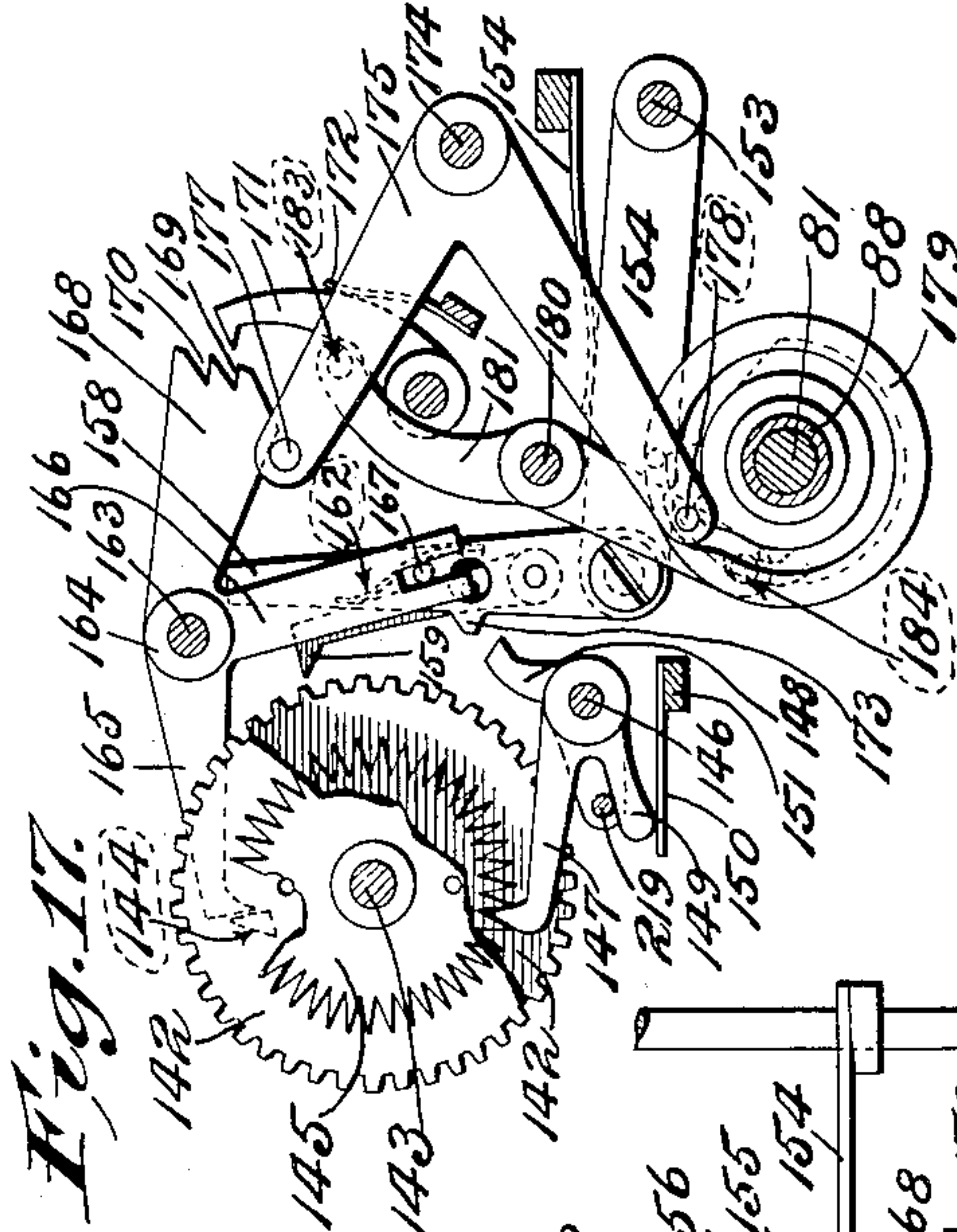


Fig. 17.

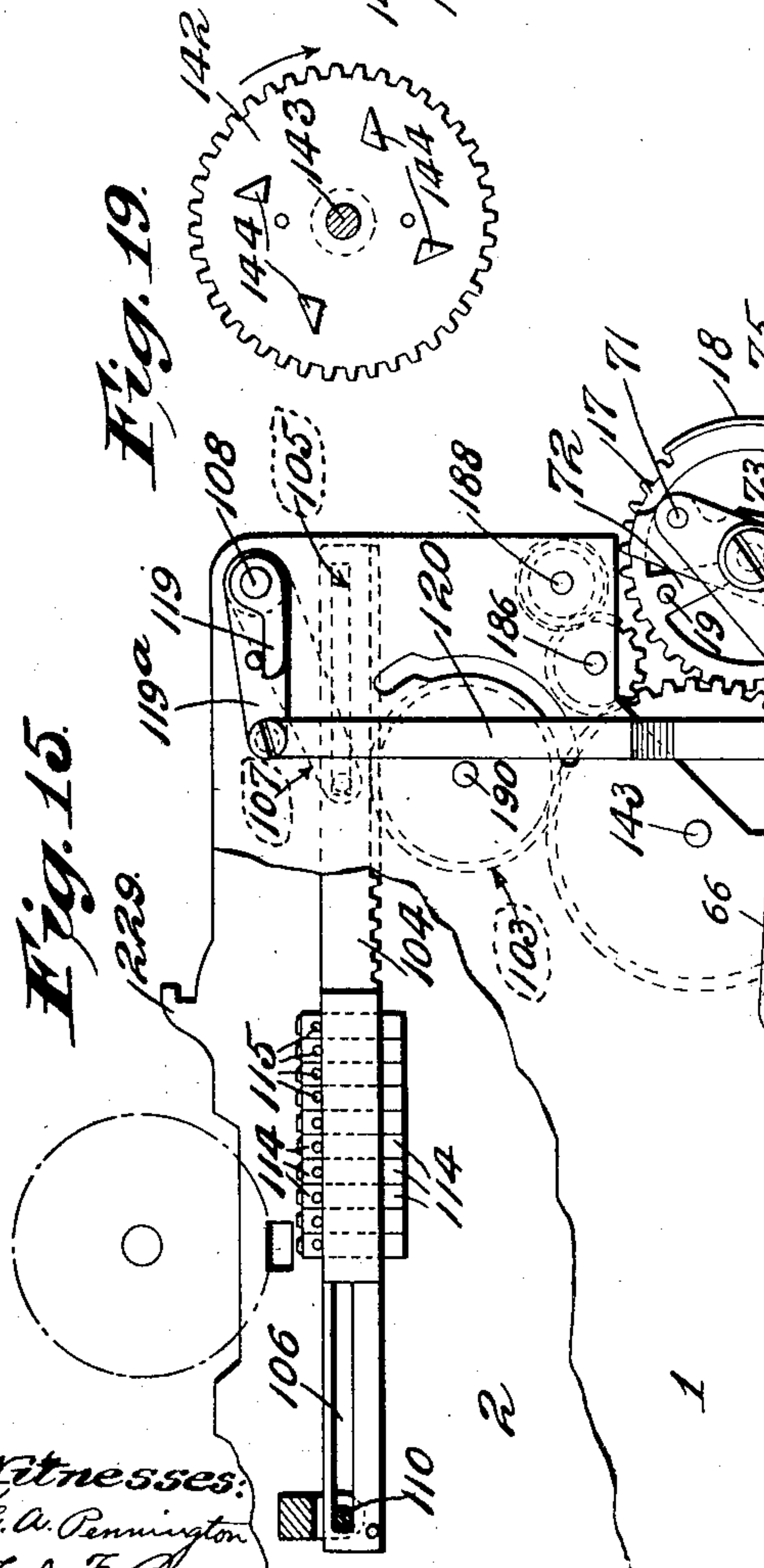
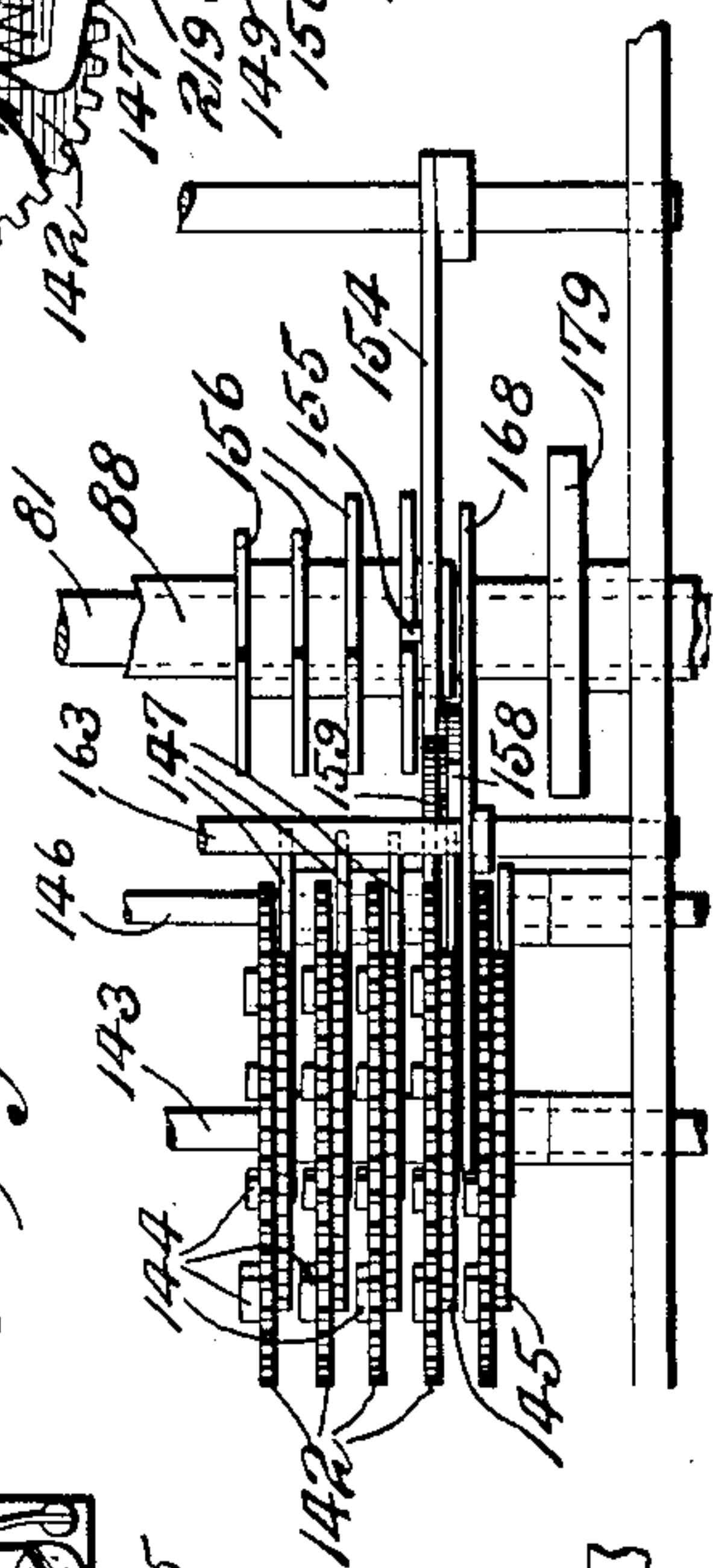


Fig. 15.

Fig. 19.

Fig. 18.



Witnesses:
G. A. Pennington
Fred F. Reimer

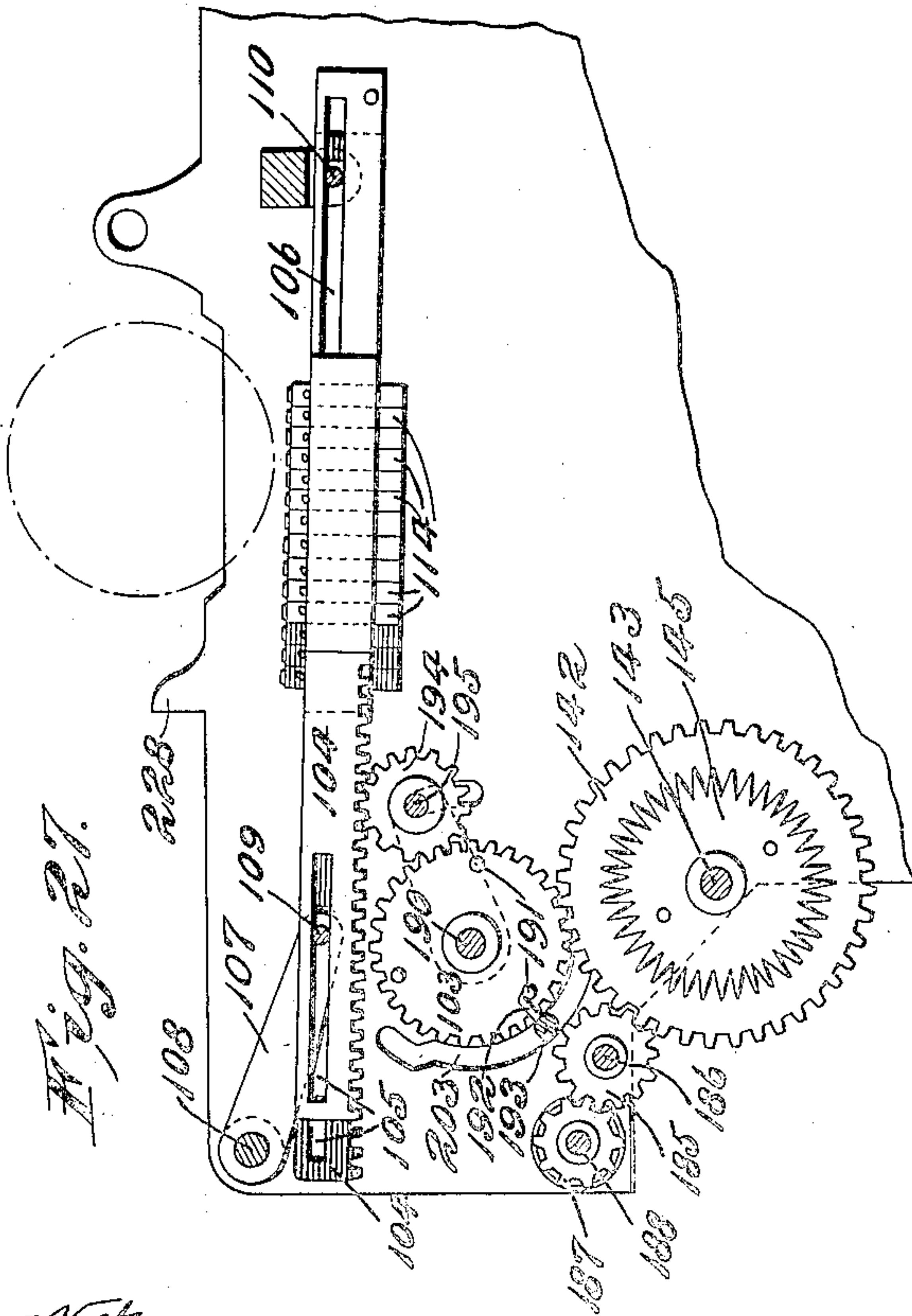
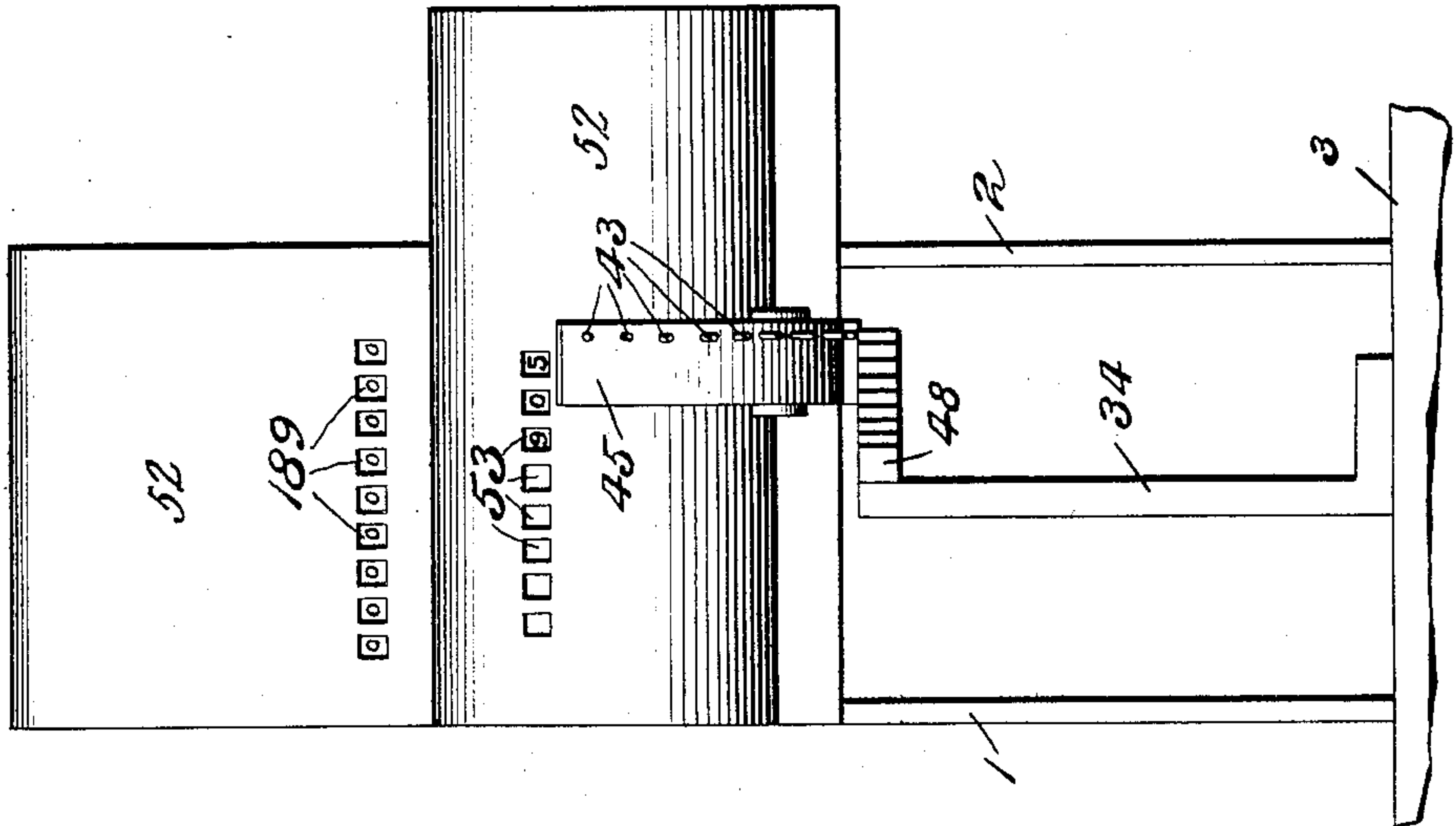
Inventor:
R. von Reppert,
By *Carst & Co.*
Attys

R. VON REPPERT.
ADDING MACHINE.

APPLICATION FILED NOV. 13, 1905.

9 SHEETS—SHEET 9.

Fig. 28.



Witnesses:
G. A. Pennington
Fred F. Reines.

Fig. 30.

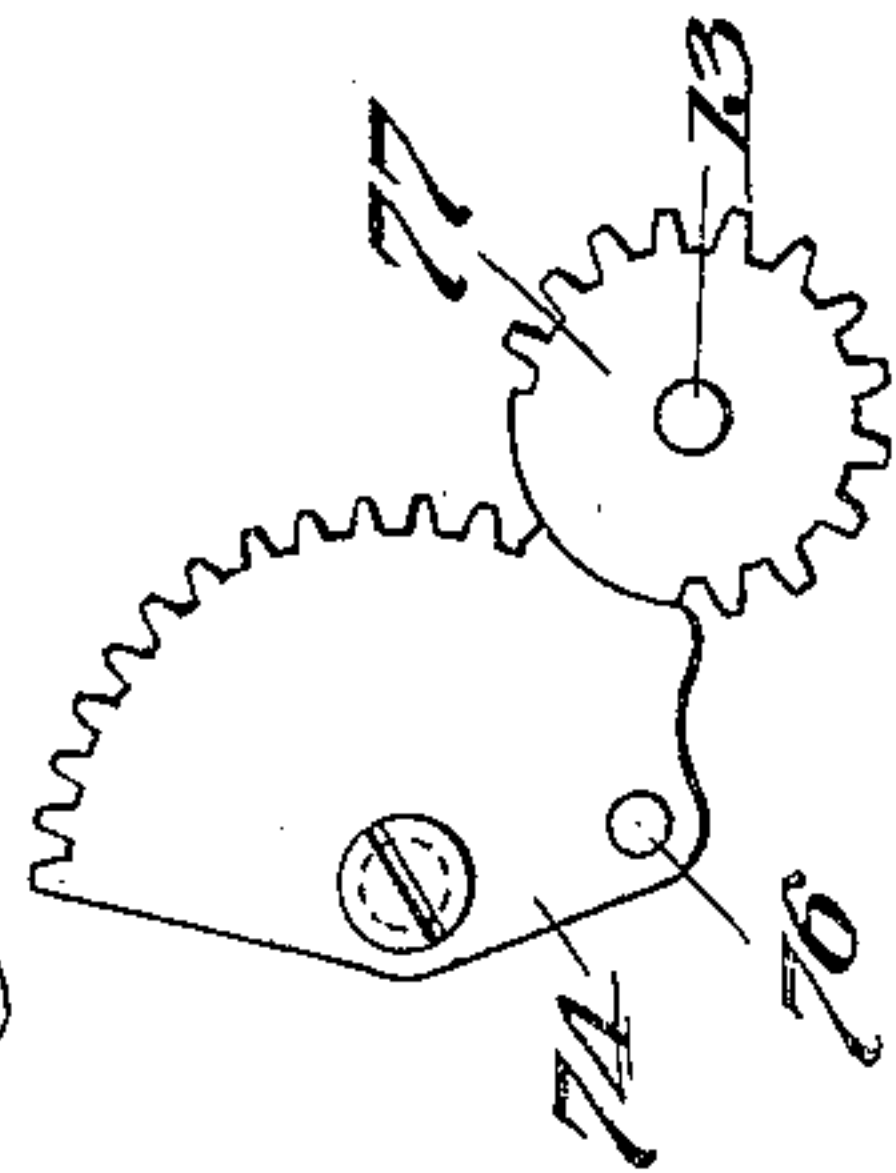
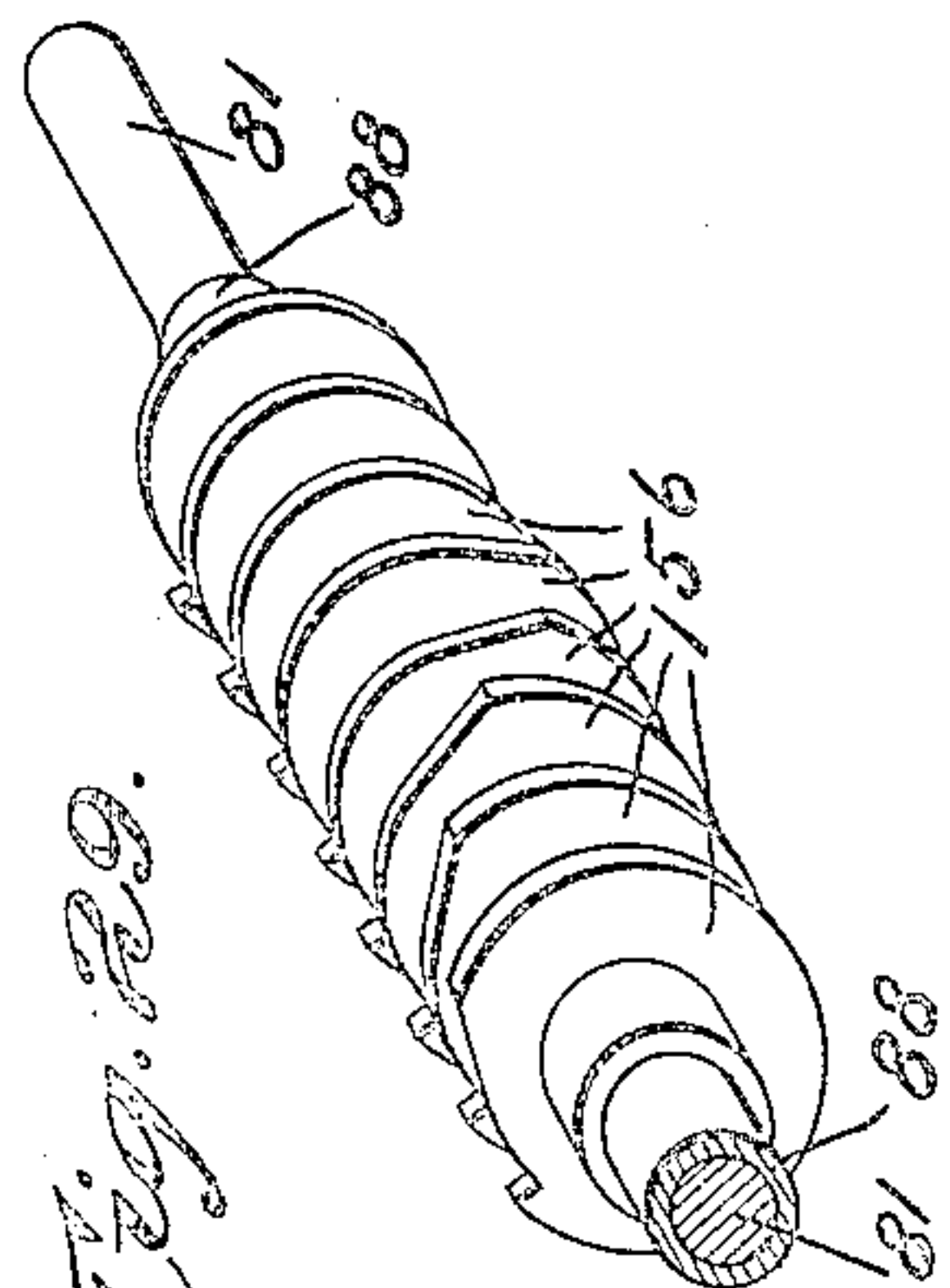


Fig. 29.



Inventor:
R. von Reppert
By Conist & Co.,
Attys

UNITED STATES PATENT OFFICE.

RICHARD VON REPERT, OF ST. LOUIS, MISSOURI.

ADDING-MACHINE.

No. 858,626.

Specification of Letters Patent.

Patented July 2, 1907.

Application filed November 13, 1905. Serial No. 287,025.

To all whom it may concern:

Be it known that I, RICHARD VON REPERT, a citizen of the United States, and a resident of the city of St. Louis and State of Missouri, have invented a new and useful Improvement in Adding-Machines, of which the following is a specification.

My invention relates to adding machines and has for its principal objects to produce a machine requiring but one key for each digit in order to add numbers of any order; to automatically arrange figures in their proper columns or orders and without necessitating any determination of the order of the number to set up or selection of keys from a plurality of columns by the operator; to reduce the amount of metal in motion in performing the cycles of operations of adding machines; to provide positively acting mechanisms for transmitting the movements of the item mechanism to the totalizing mechanism and the printing mechanism; to use a portion of the totalizing mechanism to transmit the items from the item mechanism to the printing mechanism; to provide item mechanism which may be set for the items to be added without affecting the totalizing mechanism; to provide a machine in which items are introduced into the totalizing mechanism by clearing the item mechanism; to provide carrying trains for the totalizing mechanism to act after the item mechanism has acted upon the totalizing mechanism; and other objects hereinafter more fully appearing.

My invention consists in the parts and in the arrangements and combinations of parts hereinafter described and claimed.

In the accompanying drawings forming a part of this specification and wherein like symbols refer to like parts wherever they occur, Figure 1 is an elevational view of one side of the adding machine; Fig. 2 is an elevational view of the opposite side of the machine; Fig. 3 is a vertical sectional view longitudinally of the machine; Fig. 4 is a front view of the machine, the key levers being shown in section and the cover plate being removed; Fig. 5 is a plan view of the keys and item mechanism, and a horizontal sectional view of the portion of the machine in the rear thereof; Fig. 6 is a perspective view of the key levers and certain associated parts; Fig. 7 is a transverse sectional view through the machine on the vertical center line of the item wheels, the key levers and connected parts being broken away to show the feed mechanism for the item wheels; Fig. 8 is a horizontal sectional view through the feed mechanism for the item wheels; Figs. 9 to 12 are details of said feed mechanism; Fig. 13 is a fragmentary elevational view showing one key lever depressed in setting up a figure of one item; Fig. 14 is a fragmentary side elevational view showing the position of the parts when the item lever is depressed to its lowermost limit; Fig. 15 is a fragmentary elevational view from the opposite side of the machine corresponding to Fig. 14; Figs. 16

and 17 are side views of trains of the carrying mechanism in the positions assumed during their cycle of operation; Fig. 18 is a plan view of some of the totalizing wheels and one train of the carrying mechanisms; Fig. 19 is a view of a totalizing wheel showing the face opposite to the faces shown in Figs. 16 and 17; Fig. 20, 21, 22 and 23 are detail views of the total lever and its connections; Figs. 24, 25 and 26 are detail views of the hammer actuating mechanism for the printing mechanism; Fig. 27 is a fragmentary sectional view showing the position of certain parts during the operation of printing the total; Fig. 28 is a fragmentary front view of the machine showing the arrangement of the sight openings in the cover plate; Fig. 29 is a perspective view of the carrier actuating cams and their supporting sleeve. Fig. 30 is a detail view of the mutilated gear of the item mechanism and its cooperating sector.

In the present adding machine the items to be added are successively set up in an item mechanism by the operation of the figure keys, of which there are ten, one for each significant figure and zero, the keys being operated just as the figure keys of a typewriter would be to write the same number. Each item is then added to the total by throwing the item mechanism into gear with the totalizing mechanism. At the same time, the item is transmitted to printing mechanism and printed, and the item mechanism is cleared. This is accomplished by the operation of an item lever. All the items being added the total is set up in the printing mechanism and printed, this being effected by the operation of a total lever, the totalizing mechanism being cleared at the same time. The mechanisms by which these steps in the operation of the machine are accomplished will be described in the order in which the steps occur in the cycle as far as possible.

The main frame of the machine consists of substantially parallel vertical plates 1, 2 which are secured to a base plate 3. Upon this simple frame all the parts of the machine are mediately or immediately supported.

For operation to set up the items ten key levers 4 are provided. (See Figs. 5 and 6). These levers are pivoted at their rear ends upon a rod 5 supported in a pillar block 6 which is secured to the base plate 3 and between the vertical plates 1, 2. The ends of the levers are spaced from each other by washers 7. The levers run parallel to each other for a considerable portion of their length and then diverge so as to accommodate the finger pieces 8. Just in the rear of the diverging portions of the key levers there is secured to the base plate a guide block 9 having spacing teeth 10 rising between the key levers 4. The finger pieces 8 are arranged in two rows, those in the rear row having characters for the even numbers and zero, respectively, and those in the lower row having characters for the odd numbers, respectively.

The key levers described above control the rotation of the item wheels and the feed of the carriage for the item wheels. The item wheels and their carriage, the feed mechanism and the means whereby they are operatively connected to the key levers will be described in order.

A forwardly projecting bearing 11 is secured to the vertical frame plate 1 and laterally offset and a forwardly projecting bearing 12 is secured to the frame plate 2. A supporting shaft 13 is secured in said bearings 11 and 12. Upon the supporting shaft 13 is rotatably mounted a sleeve 14 and upon the sleeve are rigidly secured a number of similar plates 15. (See Figs. 3 and 13.) These plates 15 extend upwardly and forwardly from the supporting shaft and carry near their upper ends a shaft 16 to carry the item wheels. Item wheels 17 are rotatably mounted on the shaft 16 and are located in the spaces between the plates 15. There are as many similar item wheels as the highest order of numbers which the machine is intended to operate upon. The machine shown has eight item wheels and is adapted to operate upon numbers of any order up to the eighth. Each item wheel is provided with teeth over a portion of its periphery and the remaining portion of the periphery is provided with a flange 18 upon which numbers are placed. These numbers serve to show the item set up as will be explained below. Each item wheel has a laterally extending pin 19 which will engage the upper edge of the adjacent plate 15 when the wheel occupies its normal position. Spiral springs 20 are connected at one end to the item wheels and at the other end to the plates 15. These springs tend to turn the item wheels out of their normal position. The item wheels are held in their normal positions by means of detents 21 of which there is one for every item wheel pivoted upon the plates 15 and which are held in engagement with the wheels by springs 22.

A rack bar 23 is secured to plates 15 and extends parallel with the supporting shaft 13. (See Fig. 7.) This rack bar is the last element in the train of the feed mechanism. It meshes with a gear wheel 24 which is integral with a ratchet wheel 25, said wheels being rigidly mounted on a shaft 26. The latter shaft extends through a housing 27 inside of which is located a spring 28. (See Fig. 12.) One end of said spring is connected to the shaft 26 and the other end to the housing 27. The spring is normally wound up and tends to rotate the shaft 26 so as to move the item wheel carriage from right to left. A pawl 29 is pivoted on the front of the housing 27 and is held in engagement with the ratchet 25 by means of a spring 30. The pawl is hook-shaped at the end engaging the ratchet and is provided with an inclined surface. An escapement pawl 31 is provided with a branch having a correspondingly inclined surface. This escapement pawl is bifurcated at its upper end and guided by a screw or stud 32 secured to the housing 27. The lower end of the escapement pawl 31 is pivotally connected to one end of a lever 33 which is pivoted on a bracket 34 secured to the base plate 3. The opposite end of the lever 33 carries a horizontal pin 35 which extends underneath all the key levers. A coiled spring 36 is connected at one end to the rear end of the lever 33 and at the other end to the base plate 3 and holds that end of the lever depressed and the escapement pawl in its lowermost position.

To release the detents which hold the item wheels in their normal positions and permit rotation of the item wheels by their springs, the following means are provided. (See Figs. 6 and 13.) A lever 37 is pivoted upon the bracket 34. At its forward end it carries a horizontal pin 38 which extends under and may be engaged by nine of the ten key levers. It does not extend under the last key to the right, the zero key, because no rotation of an item wheel is necessary to set it to zero. At its rear end the lever 37 carries a pin 39 which extends laterally beyond all the keys and carries on its end a vertical detent-disengaging rod 40 which is guided in a bearing 41. The end of this detent-disengaging rod rests immediately below the position successively assumed by the detents 21 of the item wheels 17 as the carriage is moved from right to left. A spring 42 is connected at one end to the rear end of the lever 37 and at the other end to the base plate 3. By means of this spring the rear end of the lever is depressed and the detent-disengaging rod is held in its lowermost position.

To set a type wheel to indicate any given digit, it is rotated through an angle which is proportional to the size of the digit. The amount of rotation of the item wheels is determined by a series of stops 43 which are controlled by the key levers. The item wheels successively move into the plane of the series of stops as the carriage moves from right to left. Each item wheel has a radial projection 44 at the lower end of its flange 18 which projects far enough to engage any one of the stops which may be moved out of normal position.

The stops 43 are pins mounted in a curved block 45 concentric with the item wheels. (See Fig. 3.) Each pin has a collar 46 upon it. A spring 47 surrounds each pin, bears at one end on its collar 46 and at its other end on the bottom of the hole in the block 45. The springs hold the stops in their normal position, that is projecting from the front side of the block 45 and withdrawn from the path of the projection 44 on the item wheel. There are nine stops, one for each digit except zero and they are spaced apart by an angular distance equal to the angular movement of the item wheels when rotated one tooth.

The stops are moved into the path of the projection 44 of the item wheel by the key levers by means of intervening levers and cams. (See Fig. 6.) A block 48 is mounted on the bracket 34 and is provided with a series of offset seats, one for each key lever representing a digit. Upon said block 48 a series of bell-crank levers 49 are pivoted, one for each pair of stops 43 and key levers 4. Each key lever 4 representing a digit except the zero key lever is provided with an upwardly extending projection or cam 50 having its front edge inclined downwardly and rearwardly. Each bell crank lever 49 has a pin 51 projecting into the path of the cam 50 of the corresponding key-lever 4. At their upper ends the bell-crank levers bear upon the front ends of the stops 43.

A casing plate 52 is secured to the front of the machine and is provided with a slot 53 through which the members set up on the item mechanism may be seen. (See Fig. 28.) The right end of the slot stops just to the left of the first item wheel when the item mechanism is cleared and in its normal position. As the items are set up the carriage moves to the left and the proper numbers on the wheels which have been operated by the key-levers are exposed through the slot.

The operation in setting up an item will now be described. Assume the number to be set up to be 905.

Before beginning the operation the parts will be in the positions shown in Figs. 1 and 3. All the item wheels 17 are standing with their stop pins 19 in engagement with the plates 15 and are held by their detents 21. The stops 43 are all retracted and the first item wheel at the left is in the vertical plane of the stops. The detent of the same item wheel is vertically above the detent-disengaging rod 40. The feed spring 28 is wound up and the pawl 29 is in engagement with the feed ratchet 25. The escapement pawl 31 and detent-disengaging rod 40 are in their lowermost positions.

In setting up the item the keys are to be operated just as if the numbers were to be written on a typewriter. Therefore the 9 key will be operated first. (See Figs. 6 and 13.) As the 9 key moves downwardly its cam 50 moves the pin 51 forwardly and turns the corresponding lever 49 on its pivot. The lever 49 pushes the last stop from its normal position into the path of the projection 44 on the item wheel. The key lever also presses down the pin 38 resulting in the tilting of the lever 37 and the raising of the detent-disengaging rod 40. The rod 40 engages the rear end of the detent 21 and disengages it from the item wheel. This item wheel being free now, it will rotate under the actuation of its spring 20 until its projection 44 engages the projecting stop 43. In this case it will rotate through the angular distance of nine teeth. At the same time that this is being done, the key lever engages and depresses the pin 35, tilts its lever 33 and raises the escapement pawl 31. (See Fig. 7.) The escapement pawl 31 engages the inclined face of the pawl 29 and pushes it out of engagement with the ratchet wheel 25 and itself enters the notch before occupied by the pawl 29. When the lever reaches the lowermost limit of its movement the parts under consideration are in the positions shown in Figs. 9 and 13. As the key lever rises under the actuation of its spring 54^a, the detent-disengaging rod 40 first releases the detent 21. The latter engages the item wheel and holds it in the position into which it has turned. The stop 43 is retracted by its spring 47 as the lever 4 and the cam 50 rise. The escapement pawl 31 is lowered and as it lowers the ratchet wheel 25 rotates under the impulsion of the spring 28 and the pawl 29 is moved laterally by its spring 30 and enters the notch next succeeding to the notch in which it rested at the beginning of the operation. Thus the gear wheel 24 is permitted to rotate and carries the rack-bar 23 and item wheel carriage to the left, bringing the first item wheel to the left into view through the slot 53, the number "9" being exposed, and bringing the second item wheel from the left into the plane of the stops 43 and its detent 21 over the detent-disengaging rod 40. Now the zero key lever will be operated. (See Fig. 6.) As it has no cam 50 and there is no stop 43 corresponding to the zero key, its depression will not throw any stop into the path of the projection 44 of the item wheel. As the pin 38 does not extend under and cannot be engaged by the zero key lever, the detent-disengaging rod will not be raised and, hence, the item wheel will not be released from its detent and no rotation will be permitted. This is as it should be for the item wheels are given an angular movement proportional to the number indicated. For zero there should be no angular movement. The pin 35 on the

lever 33 will, however, be depressed by the zero key lever and the carriage will be moved one space to the left by the operation of the escapement pawl 31, ratchet wheel 25 and gear wheel 24 as described above in detail in discussing the movements resulting from the operation of the "9" key lever. (See Fig. 7.) Thus, the carriage will be moved one space to the left; the second item wheel will be visible through the slot 53, its zero being exposed and the third item wheel will be brought into the plane of the stops 43, its detent 21 being above the detent-disengaging rod 40. The number to be read through the slot 53 is now "90". Next the "5" key lever will be operated. The effects of the operation of this key lever will be the same as when the "9" key lever was operated with the exception that the fifth stop 43 will be projected into the path of the projection 44 of the item wheel instead of the ninth stop and the item wheel will be permitted to turn five teeth only instead of nine. At the end of the operation the third item wheel will be visible through the slot 53 the number exposed being 905.

So much of the item mechanism has been described above as is involved in the operation of setting the machine to add a particular item to the total. The remaining features have to do with the operation of totalizing, clearing the item mechanism, and returning it to its normal position. These features will now be described before taking up the totalizing mechanism. As to the latter, it will suffice at this point to say that the totalizing mechanism comprises a series of gear wheels 142 having at least as many wheels as the item mechanism.

When the item mechanism is in its normal position, all the item wheels are to the right of the totalizing wheels, as shown in Figs. 4 and 7. The totalizing wheels are spaced apart the same distance as the item wheels are. As the item mechanism moves to the left certain of its item wheels are brought into the vertical planes of certain of the totalizing wheels. The last totalizing wheel to the right is the units wheel or wheel representing the lowest order, the wheels to the left representing in order the succeeding higher orders. The item wheel indicating the number of the last key lever operated is always in the vertical plane of the last totalizing wheel to the right. Thus, in the example mentioned above, the third item wheel, indicating "5", is in the vertical plane of the last totalizing wheel to the right or the units wheel; the second item wheel, indicating "0", is in the plane of the next totalizing wheel or the tens wheel; and the first item wheel, indicating "9", is in the plane of the hundreds totalizing wheel. The item wheels and totalizing wheels are not, however, in mesh, but are separated from each other by a short distance as shown in Figs. 2 and 3. In order to add the number indicated on the item mechanism to the total, the item wheels and totalizing wheels involved must be brought into mesh and the item wheels rotated. The mechanism whereby this is accomplished will now be described.

The operation of the item mechanism to throw an item into the total is effected by an item lever 54 which is pivoted in bearings secured to the base-plate 3 at one side of the key levers and has a knob 55 in convenient proximity thereto. See Figs. 1 and 14. The item lever is provided at its rear end with a laterally offset

portion 56. A recess 57 is countersunk in said portion and a switch-cam 58 is pivoted therein. Said cam terminates at its ends in substantially parallel inclined surfaces. It is held in its normal position by means of a spring 59 secured to the pivot stud and which engages at its ends pins 60 in the ends of the switch-cam. Normally the lower end of the switch-cam is in contact with the front wall of the recess and its upper end is in contact with the rear wall.

10 A shaft 61 is pivoted in the frame plates 2, 3 just in the rear and below the lower rear end of the item lever. An arm 62 is rigidly mounted on said shaft 61 and carries a pin 63 which enters between the upper wall of the recess 57 in the item lever and the upper end of the switch-cam 58. See Figs. 2 and 15. On the end of the shaft projecting at the opposite side of the frame an arm 64 is rigidly secured in a substantially horizontal position extending forwardly. At its front end it is bifurcated or slotted. A rod 65 is pivotally supported on and depends from a lever 66 pivoted on the frame plate 1. At its lower end said rod 65 carries a pin or screw stud 67 which enters a slot in the end of the arm 64. Near its upper end said rod 65 carries a second pin or screw stud 68 which enters a slot in the rear end of a bell-crank lever 69 which is mounted on the end of the shaft 13. Near the opposite end of the shaft 13 is mounted an arm 70 which is similar to that portion of the bell-crank lever 69 extending from the shaft 13 upwardly and forwardly. A rod 71 is mounted in the front ends of the bell-crank lever 69 and arm 70 and extends loosely through upwardly and forwardly extending prolongations of the plates 15. Thus, the plates 15 and the item mechanism are supported at the front by the rod 71 and connected parts and are subject to the movement of those parts about the shaft 13 as a center. The means thus described will effect the engagement of the item wheels and totalizing wheels as will be shown in detail below.

The item wheels are skeletonized and each has but two radial arms. See Fig. 15. One 72 carries the stop pin 19 mentioned above and the other 73 is so located that its upper edge will engage the rod 71 when the wheels are in their normal position.

A sector 74 is pivoted on the arm 70, its pivot being in alinement with the shaft 16 of the item wheels. See Figs. 1, 4 and 5. An arm 75 is similarly pivoted on the bell-crank lever 69, and depends therefrom when in its normal position. A rod 76 is mounted in said sector 74 and arm 75 and extends through all the item wheels. The curved portion of the periphery of said sector 74 is provided with the teeth for a locking gear, the toothed portion terminating at one end in a concavity fitting a corresponding convexity on the cooperating gear. Two rigidly connected or integral gear wheels 77, 78 are loosely journaled on the end of the supporting shaft 13. The gear 77 is a mutilated gear arranged in the plane of the sector 74, having teeth adapted to mesh with the teeth of the sector, and having a portion of its teeth displaced by a convexity fitting the concavity of the sector 74. The gear wheel 78 is in the plane of the item lever 54 and meshes with a curved rack on the front edge of an upwardly extending curved extension 79 of said item lever, the center of curvature of said extension being the pivotal center of said lever.

To restore the item lever and item wheel carriage the following mechanism is provided. See Fig. 5. The rear edge of the offset portion 56 of the item lever 54 is provided with gear teeth 60 the pitch line of which is curved and is concentric with the pitch line of the rack 79. A shaft 81 is journaled in the frame plates 1, 2 and carries on the end adjacent said rack 80 a gear wheel 82 which meshes with said rack. On the end of the shaft 81 projecting from the opposite side of the frame a spring casing 83 is loosely mounted. Said casing is open toward the frame plate and is closed thereby. It is provided with a peripheral flange 84 which bears on the frame plate and is provided with a plurality of notches 85. A gravity pawl 86 is mounted on the frame plate in position to engage the periphery of said flange 84 and the notches 85 therein. A spiral spring 87 is mounted inside the casing 83 having one end secured to the casing and the other secured to the shaft 81, being coiled so as to resist, and, be wound up by, rotation of the shaft by the item lever when its knob is depressed. The initial tension of the spring can be adjusted by turning the casing by means of its knurled knob, the gravity pawl 86 holding it at any tension desired.

Upon the shaft 81 a long sleeve 88 is loosely mounted. This shaft has at the end adjacent the gear wheel 82 a flange or collar 89 provided with a single notch. (See Figs. 5 and 8.) Said gear wheel 82 carries a pawl 90 arranged to engage said notch. The gear wheel 82 is so proportioned that for a full stroke of the item lever it will make one complete revolution. The sleeve 88 is connected with the feed mechanism for the item wheel carriage by intermediate gearing. A gear wheel 91 is rigidly mounted on said sleeve. A shaft 92 is journaled in a tubular boss on the frame plate 2 and carries on its outer end a gear wheel 93 which meshes with said gear wheel 91. A bevel gear 94 is mounted on the inner end of the shaft 92. It meshes with a corresponding bevel gear 95 which is loosely mounted on the shaft 26 of the carriage feed mechanism, the end of the shaft projecting to the rear of the housing 27 for the spring 28. A disk 96 is rigidly mounted on said shaft 26 between the bevel gear 95 and the rear wall of the housing and has a peripheral notch 97. See Figs. 10 and 11. The gear wheel 95 has a peripheral disk-like extension 98 which carries a pawl 99 which is arranged to be held in engagement with the periphery of said disk 96 by a spring 100. A shield 101 is mounted on the housing 27 in position to disengage the pawl 99 from the notch 97 in the disk 96 when the latter has been returned to its normal position. For this purpose, the pawl carries a pin 102 which will be engaged by the shield and will ride up on it as the gear wheel 98 rotates. When the parts are all in their normal position the notch 97 is back of the shield 101 and the pin 102 of the pawl 99 is resting on the shield.

The operation of throwing the item wheels and totalizing wheels into mesh, throwing the item into the total and clearing the item mechanism is as follows: Assume that the item mechanism is set for "905" as at the close of the description of the setting up of that number above. The first item wheel from the left indicating "9" has rotated so far that its radial arm 73 is in contact with the rod 71. See Fig. 2. The second item wheel, indicating "0" was not rotated and its radial arm 73 is in its

normal position. The third item wheel, indicating "5" has rotated five teeth and its radial arm has been carried from its normal position a proportional distance. Now let the knob of the item lever 54 be pressed downwardly. During the initial portion of the movement of the item mechanism the pin 63 on the arm 62 will be engaged by the upper end of the switch-cam 58 and will be moved forwardly. This will turn the shaft 61, depress the front end of the arm 64, lower the rod 65 and the rear end of the bell-crank lever 69, and raise the front end of said bell-crank lever and the rod 71, and turn the item wheel carriage about the shaft 13 bringing the item wheels into mesh with the totalizing wheels as shown in Figs. 14 and 15. During the time these movements are taking place the gear wheels 77 and 78 are turned by the curved rack 79 but without turning the sector 74 as the convexity of the gear wheel 77 is turning idly in the concavity of the sector. (See Fig. 1.) However, at the moment that the item wheels and totalizing wheels are brought into mesh, the first tooth of the gear wheel 77 meshes with the sector. Subsequent movement of the item lever and gear wheels causes the rotation of the sector 74 and its rod 76 is caused to sweep upwardly. The rod 76 will engage the radial arms 73 of all item wheels which are out of their normal position and carry them along. Thus the item wheels will be turned through an angular distance proportional to the amount of their displacement from normal and necessarily a like amount of rotation will be imparted to the totalizing wheels. The proportions of the curved rack 79, gear wheels 77, 78 and sector 74 are such that a full downward stroke of the item lever will cause the sector and its rod 76 to restore all the item wheels to their normal position in which they will be retained by their pawls 21. Thus, in the example taken the third item wheel, indicating "5" will be turned five teeth and the units totalizing wheel in mesh therewith the same amount; the second item wheel, indicating "0", will not be turned at all, nor will the tens totalizing wheel in mesh therewith; and the first item wheel, indicating "9", will be turned nine teeth and the hundreds totalizing wheel in mesh therewith the same amount. While these operations were being performed, the shaft 81 and the gear wheel 82 were given a full revolution. During this revolution the pawl 90 on the gear wheel 82 simply rode on the periphery of the collar or flange 89 on the sleeve 88 and at the end of the revolution rests again in the notch in said collar or flange. Thus no movement was imparted to the sleeve 88. The rotation of the shaft 82 wound up the main spring 87. Now, the item lever being released by the operator the main spring 87 will induce the following movements. It will cause the rotation of the shaft 81 and the gear wheel 82 in the reverse direction. This will cause the depression of the rear end of the item lever by reason of the engagement of the gear wheel 82 with the rack 80. The initial portion of this restoring movement is just the reverse of the initial portion of the stroke. The pin 63 on the arm 62 of the shaft 61 is engaged by the lower end of the switch-cam 58 and moves it to the rear. This turns the shaft 61, raises the front end of the arm 64 and the rod 65, tilts the bell-crank lever 69 and throws the item wheels and totalizing wheels out of mesh. The pawl 90 of the gear wheel 82, being in engagement with the notch in the collar 89 on the sleeve 88, will cause the rotation of said

sleeve, the gear wheels 91, 93 and the bevel gears 94, 95. The pawl 99 will be carried around by the gear wheel 95; as soon as its pin 102 is carried beyond the shield 101, the pawl will engage the periphery of the disk 96 and will catch the notch 97 thereof wherever it may be. Thereafter it will turn the disk 97, the shaft 26 and the gear wheel 24 and the item wheel carriage will be restored to its normal position as it was at the beginning of the operation. At the same time the rotation of the gear wheel 82 in mesh with the rack 80 on the item lever is continuing the depression of the rear end of the item lever and causing the rotation of the gear wheels 87 and 88 and the sector 74, the latter being restored to its initial position with its concavity engaged by the convexity on the gear wheel 87. Thus, the parts are all restored to their original or normal positions and are ready for another operation.

Before describing the totalizing mechanism, the mechanism whereby the items are printed will be described. In the operation of printing the items, the totalizing wheels 142 play a part but merely as transmission gears. Above the totalizing wheels is arranged a series of gear wheels 103 equal in number to the number of totalizing wheels which are respectively permanently in mesh with the totalizing wheels. See Figs. 3 and 14. Above the gear wheels 103 is arranged a series of type-bars 104. At their front ends, the lower edges of the type-bars are provided with gear teeth adapted to mesh with the gear wheels 103. These bars are provided with slots 105 and 106 at their front and rear ends, respectively. Arms 107 are mounted on a shaft 108 journaled in the frame plates 1 and 2 and extend rearwardly. A rod 109 mounted in the rear ends of said arms 107 extends through the slots 105, supports the front ends of the type-bars and holds them normally out of engagement with the gear wheels 103. A rod 110 is mounted on the frame and extends through the slots 106 and supports the rear ends of the type bars. The type bars are normally held in their foremost positions by means of the bell-crank levers 111, one for each type-bar, and springs 113. The bell-crank levers are mounted on a shaft 112 secured in the frame and one arm of each has a pin-and-slot connection with the rear end of its respective type-bar. One of the springs 113 is connected to the other arm of the lever. Each type-bar has a vertical slot in which vertically movable type 114 are mounted. The type, of which there is one in each type-bar for the digits, are supported by lateral projections 115 resting on the upper edges of the bars. On a rod 116 extending across the frame a saddle 117 for each rack bar is pivoted and they are held in engagement with the projections 115 of the type 114 occupying the printing position by springs 118 mounted on a bar extending across the frame. The front ends of the type-bars are raised and lowered by oscillating the shaft 108. The oscillating movement is imparted by the mechanism which throws the item wheels in mesh with the totalizing wheels by means of the following connection. The shaft 108 projects through the frame plate 1 and on its projecting end an arm 119 is rigidly mounted. A lever 119^a is loosely pivoted on the shaft 108 and has a pin bearing upon the upper side of said arm 119. See Fig. 4. A link 120 connects said lever 119^a and the lever 66 hereinbefore described. Springs 107^a see Fig. 14 bearing on the arms 107 hold the type-bars in their nor-

mal positions and the arm 119 in contact with the pin on the lever 119^a.

The impression of the appropriate types is produced by the stroke of a hammer or hammers which are arranged and operated as follows: See Figs. 3 and 26. A shaft 121 is mounted in the frame plates 1, 2 just below the rear ends of the type-bars. On this shaft is mounted a series of hammers 122 equal in number to the number of type-bars or a single hammer having a face wide enough to engage the type of all the type-bars. The shaft projects through the frame on both sides. At one end it carries a disk 124. See Fig. 24. A rod 125 is mounted on said arm and disk and extends through slots 126, 127 in the frame plates 1, 2, respectively, the slots being curved to permit movement of the rod 125 as the arm and disk turn with the shaft 121. The disk 124 is provided with an integral sleeve 128 projecting outwardly. A spring casing 129 is loosely mounted on said sleeve 128 and retained in position by a washer and a screw entering the end of the shaft 121. A coiled spring 130 see Fig. 25 is mounted in the casing 129, one end being connected to said sleeve 128 on the disk 124 and the other end being connected to the spring casing 129. The disk 124 is provided on its periphery with a notch which is engaged by a pawl 131 pivoted on the frame plate. The pawl 131 is substantially a bell-crank having an arm 132 by means of which it may be tripped. The spring casing 129 has a peripheral flange 133 which is provided with gear teeth throughout a part of its circumference. See Figs. 1 and 25. These teeth mesh with a curved rack or segment of a gear wheel 134 which is carried by an arm 135 pivoted on a stub-shaft 136 extending outwardly from the frame plate 2. The rack or segment 134 terminates in a projection 137 which is in position to engage the arm 132 of the pawl 131 at the termination of its upward stroke. Upon the stub-shaft 136 is also pivoted a bell-crank lever 138, one of the arms of which carries a pin 139 in position to engage the arm 124 of the curved rack or segment 134 and the other arm of which carries a curved rack or segment 140. The curved rack or segmental gear 140 is in mesh with the gear wheel 82 on the shaft 81 which is also in mesh with the curved rack on the item lever 54.

The paper feed mechanism will not be described until the totalizing mechanism and mechanism for printing the total has been described. Suffice it at this point to say that the paper upon which the items and total are to be printed passes around a cylindrical platen which is vertically above the transverse row of types to be printed. The operation of setting up the item on the printing mechanism and the printing of the item will now be described.

Before the item lever 54 is pressed all the type-bars 104 rest in their foremost positions as indicated in Fig. 3. The "0" type of the series of type 114 in each type-bar 104 are in position beneath the platen to be impressed upon the paper. Any other type on each type-bar may be brought into zero position by rearward movement of the type-bar. The item lever 54 being depressed, the initial portion of its movement, which throws the item wheels into mesh with the totalizing wheels, as described above, will lower the type-bars and cause their teeth to mesh with their respective gear wheels 103. This is done by means of the link 120 which moves downwardly with the front

end of the lever 66 and depresses the rear end of the arm 119, rocks the shaft 108 and causes the depression of the rod 109 and the type-bars 104. (See Fig. 15.) Subsequent movement of the item lever causes the revolution of the item wheels, as described above. The revolution of the item wheels causes a like revolution of the totalizing wheels, and the gear wheels 103. The rotation of the latter wheels will cause a proportional rearward movement of the type-bars 104. Thus, the first type-bar to the right, or the units type-bar, which is geared to the third item-wheel indicating "5" in the example taken above, will be moved rearwardly five teeth and its type "5" will be brought into printing position. As the second item wheel, indicating "0" in the example taken above, receives no rotatory movement, the second type-bar from the right, or the units type-bar will not be moved and its type "0" will remain in the printing position. The third or hundreds type-bar will be moved rearwardly nine teeth and its type "9" will be brought into the printing position. The position of a type bar set to print "9" is shown in Fig. 14. While these movements were taking place the continuous rotation of the gear wheel 82 has turned the segmental gear 140 and bell-crank lever 138 about the stub-shaft 136. (See Fig. 1.) The pin 139 of the bell-crank lever 138 being in engagement with the arm 135 of the segmental gear 134, the movement of the latter about the stub-shaft 136 is also produced and consequently the revolution of the spring casing 129. The disk 124 is held by the pawl 131 and consequently the rotation of the spring casing 129 winds up the spring 130. Now just as the item-lever 54 finishes its downward stroke, just as the type-bars reach their proper position of adjustment, just as the oscillation of the segmental gear 134 about the stub-shaft 136 is completed, the projection 137 on the segmental gear engages the arm 132 of the pawl 131 and disengages the latter from the notch in the disk 124. The disk 124 being thus suddenly released, the spring 130 will cause it to rotate rapidly and the rod 125 will drive the hammer 122 with sudden impact against the type in printing position and causes their impression upon the paper through the ink-ribbon. The upward movement of the hammers is limited by a stop 141. The item lever being released, during the initial portion of its return movement the type-bars are thrown out of mesh with the gear wheels 103 just as the item wheels and totalizing wheels are thrown out of mesh. (See Figs. 3 and 15.) Then the springs 113 acting through the bell-crank levers 111 return the type-bars to normal position. The reverse rotation of the gear wheel 82, caused by the return movement of the item lever, restores the bell-crank lever 138 to normal position. The pin 139 being thus carried out of the path of the arm 135 carrying the segmental gear 134, these parts and the hammers 122 will resume their normal positions by gravity and the spring casing 129 and disk 124 will be by them restored to normal position.

The mechanism involved in the totalizing operation will now be described. (See Figs. 3, 16, 17, 18 and 19.) As has been pointed out above, totalizing wheels 142 equal in number to the number of the item wheels 17 or more are provided. These are rotatably mounted on a shaft 143 secured in the frame plates 1, 2. Each

of these totalizing wheels in the machine illustrated has forty teeth though wheels having any multiple of ten teeth would be used. Upon one side each wheel is provided with laterally projecting pins 144, one for each ten teeth on the wheel, which coöperate with the carrying mechanism. These pins are preferably wedge-shaped, the point of the wedge extending outwardly from the center of the wheel, so that they will act as cams with coöperating parts. To the opposite side of each totalizing wheel is rigidly secured a star wheel 145 having as many notches as the totalizing wheel has teeth. On a shaft 146 extending across the frame behind and below the totalizing wheels 142 a number of pawls 147 are mounted, one for each star wheel 145. The pawls each have two trip arms; one 148 extending upwardly and rearwardly; and the other 149 extending forwardly. Springs 150 mounted on a bar 151 bear upon the latter arms and hold the pawls in engagement with the star wheels. A plate 152 secured to the plates 15 of the item wheel carriage extends rearwardly over the forwardly extending trip arms 149 of the pawls 147 in position to engage the same and disengage the pawls from their respective star wheels when the carriage is tilted to throw an item into the total.

The carrying mechanism is arranged in the rear of the totalizing wheels. On a shaft 153 a lever 154 is pivoted in the plane of each totalizing wheel except the first wheel to the right, or the units wheel. Near its front end each lever 154 has a laterally projecting pin 155 which rests upon the periphery of a disk cam 156 rigidly secured on the sleeve 88 on the shaft 81. The pins are held in contact with the cams by springs 157 bearing upon the tops of the levers 154. Normally the pins 155 rest in the lowest portions of the cams 156 as indicated in Fig. 16. The cams are similar but differ in the angular extent of their lowest portions. The angular extent of the low portion is least in the cam for the tens lever and gradually increases in the succeeding cams for the levers for the higher orders. This causes the elevation of the levers 154 successively, beginning with the tens lever, as the sleeve 88 and cams 156 revolve. Upon the side of each lever 154 toward the totalizing wheel of the next lower order and at the front end thereof an upwardly extending arm 158 is pivotally mounted. On one side and in the plane of the lever 154 and its corresponding totalizing wheel, a pawl 159 is pivoted on said arm 158 and extends upwardly and forwardly into proximity to the totalizing wheel. The pawl 159 has a pin 160 in the face toward the arm 158 which enters a hole 161 in the arm. This arrangement limits the movement of the pawl with respect to its arm. A spring 162 mounted on the arm and bearing on the pawl holds the latter normally in its foremost position. Near the upper ends of arms 158 a shaft 163 is mounted in the frame of the machine. Upon this shaft three-arm levers 164 are mounted in the plane of the projections or pins 144 of the totalizing wheels. Of the three arms of these levers one extends forwardly and constitutes a pawl 165 to be operated by the pins 144; one 166 extends downwardly and is provided at its lower end with a slot which is occupied by a pin 167 on the arm 159; and one 168 extends rearwardly and is provided with notches 169, 170 which may be engaged by locking pawls 171 of which there are as many as there

are three-arm levers 164, the pawls being held in working position by springs 172.

The arms 158 are in the planes of the star wheels 145 on the totalizing wheels and have forwardly extending projections 173 in position to engage the trip arms 148 of the pawls 147.

Above and slightly forward of the shaft 153 a shaft 174 is journaled in the frame plates 1, 2 of the machine. Near one end of said shaft 174 is rigidly mounted a bell-crank lever 175 having one arm extending downwardly and forwardly and the other arm extending upwardly and forwardly. An arm 176 is rigidly secured near the opposite end of said shaft 174 and extends parallel with the upwardly and forwardly extending arm of the bell-crank lever. A rod 177 is carried by said parallel arms in position to engage the rear arms of the three-arm levers 164 when said bell-crank lever 175 is oscillated. The downwardly and forwardly extending arm of the bell-crank lever 175 carries an inwardly extending pin 178 which enters the groove of a grooved cam 179 which is secured to the sleeve 88 on the shaft 81.

Above the front end of the levers 154 a shaft 180 is pivoted in the frame plates 1, 2. Near the end of said shaft 180 but inside of the bell-crank lever 175 a lever 181 is rigidly secured. An arm 182 is secured at the opposite end of said shaft 180 but inside of the arm 176 on the shaft 174 and extends parallel to the upper arm of the lever 181. Said arm 182 and lever 181 carry a rod 183 in position to engage the locking pawls 171 for the three-arm levers 164 when said lever and its shaft are oscillated. The lower arm of said lever 181 carries an outwardly extending pin 184 which enters a groove in the face of said grooved cam 179 opposite to the face provided with the groove engaged by the pin 178 on the bell-crank lever 175. The grooves in said cam are concentric with the sleeve 88 throughout the greater portion of their extent, the eccentric portions having a small angular extent so that the movement produced shall be of short duration. The eccentric portion of the groove for the pin 184 of the lever 181 is arranged just in advance of the eccentric portion of the groove for the pin 178 of the bell-crank lever 175 so that the former lever shall be oscillated in advance of the oscillation of the latter lever.

Transmission gear wheels 185 are rotatably mounted on a shaft 186 above and in advance of the totalizing wheels 142 and are respectively permanently in mesh with the said totalizing wheels. (See Fig. 3.) In advance of said transmission gear wheels and at the front of the frame indicating wheels 187 are rotatably mounted on a shaft 188. These indicating wheels comprise gear teeth and cylindrical surfaces on which the figures from "0" to "9" appear. One figure on each wheel is visible through a slot 189 in the cover plate or casing. The gear teeth of the indicating wheels are respectively in mesh with the transmission gear wheels 185. The indicating wheels have ten teeth and, hence, each revolves four times for each revolution of its respective totalizing wheel 142; or revolves once each time its respective totalizing wheel moves through the angular distance between its pins 144. Thus the total is indicated.

The totalizing operation will now be described. When the totalizing mechanism is clear, that is before a

single item is thrown into the total, the indicating wheels 187 all show 0's through the slot 189 of the casing. The carrying mechanism stands in the position shown in Fig. 3 and each of the pawls or arms 165 of the three-arm levers 164 stands just in the rear of a pin 144 of its respective totalizing wheel. The pawls 147 are in engagement with the star wheels 145. Now revert to the example used above. The item mechanism is set for "905." The item lever 54 being operated the item carriage is tilted so as to bring the item wheels 17 into mesh with the totalizing wheels 142. This brings the plate 152 down on the forwardly extending arms 149 of the detents 147 and disengages the detents from their respective star wheels 145. Then the item wheels are rotated as described above and their rotation is imparted to the totalizing wheels, the units totalizing wheel, its transmission gear wheel 185 and units indicating wheel 187 being rotated five teeth, the member "5" being exposed through the slot 189 of the cover plate. The tens wheel is not rotated at all and, hence, the "0" of the tens indicating wheel will remain exposed through the slot 189 of the cover plate. The hundreds totalizing wheel, transmission gear wheel 185 and hundreds indicating wheel 187 will be turned nine teeth and the number "9" will be exposed through the slot 189. Thus, the number "905" will be disclosed through the slot. When the item lever 54 is released and the restoring movement begins, the item wheel carriage is first lowered to disengage the item wheels from the totalizing wheels. At the same time the plate 152 on the carriage releases the detents 147 and they engage their respective star wheels. Later in the period of the restoring movement the sleeve 88 rotates and with it the cams 156 and 179 causing the oscillation of the levers 154, 175 and 181 but this movement is idle as there is nothing to carry.

Now, let "95" be set up on the item mechanism and thrown into the total. This will make the total 1000 and will bring the carrying mechanism into play. (See Figs. 16, 17, 18 and 19.) At the beginning of this operation, a pin 144 of the units totalizing wheel being set to "5" is five teeth in advance of the pawl or arm 165 of its respective three-arm lever 164 and has one pin 144 five teeth in the rear thereof; a pin 144 of the tens totalizing wheel, being set to "0," is immediately in advance of the pawl 165 of its respective three-arm lever 164 and has one pin 144 ten teeth in the rear thereof; and a pin 144 of the hundreds totalizing wheel, being set to "9" is nine teeth in advance of the pawl of its respective three-arm lever 164 and, has one pin 144 one tooth in the rear thereof. The item lever being depressed the operations described above will be repeated, the plate 152 releasing the star wheels 143 from their detents 142. The units totalizing wheel will be turned five teeth by the item wheel in mesh with it. This will cause the pin 144 which was five teeth behind the corresponding pawl 165 at the beginning of the operation to pass under and trip the pawl, thus oscillating the three-arm lever. This oscillation swings the lower arm 166 of the three-arm lever forwardly and carries the arm 158 forwardly so that its projection 173 rests immediately beneath the arm 148 of the pawl 147 belonging to the tens totalizing wheel and brings the pawl 159 into engagement with the tens totalizing wheel. The detent 171 is permitted to engage the upper notch 170 in the rear arm 168 of the

three-arm lever and lock the parts in their new positions. At the end of this operation, the parts are in the position shown in Fig. 16. The tens wheel is turned nine teeth by the item wheel in mesh therewith which is set for "9" and this will leave a pin 144 just one tooth behind the pawl 165 of the corresponding three-arm lever 164. Now, let the item lever be released and the restoring movement begin. The item wheel carriage assuming its normal position during the initial portion of the restoring movement, all the detents 147 are permitted to engage their respective star wheels 143. Then the sleeve 88 begins to turn under the impulse of the main spring 87 acting through the shaft 81, gear wheel 82, pawl 90 and collar 89. The cam 156 corresponding to the tens totalizing wheel first raises its lever 154, the parts, be it remembered, being in the positions shown in Fig. 16. As the front end of the lever 154 rises the arm 158 is raised with it, the projection 173 on said arm engages the arm 148 on the detent 147 and disengages it from its star-wheel 145, the pawl 159 turns the tens totalizing wheel one tooth and thereafter the projection 173 passes out of engagement with the arm 148 of the detent 147 and the latter again locks the wheel 142 against rotation. Now a pin 144 on this tens totalizing wheel was just one tooth behind the pawl or arm 165 of its corresponding three-arm lever 164. Consequently, the movement produced by the pawl 159 will cause the pin 144 to trip the pawl and set the mechanism for carrying to the hundreds wheel to carry just as the mechanism for carrying to the tens wheel was set as described above. This is done before the cam 156 for the hundreds totalizing wheel has turned far enough to raise its lever 154. The carrying mechanism being thus set with the projection 173 in position to trip the detent 147, and the pawl 159 in engagement with the hundreds wheel, the further rotation of the sleeve 88 and its cams will cause the lever 154 corresponding to the hundreds wheel to be raised, the detent 147 will be disengaged from the star wheel 145 of the hundreds wheel and the pawl 159 will advance the hundreds wheel one tooth. Here, again, there was at the beginning of the restoring movement of the item-lever a pin 144 one tooth behind the arm 165 of the corresponding three-arm lever 164. Consequently, the addition of "1" will cause the three-arm lever to be tripped and the mechanism for carrying to the thousands wheel will be set to carry "1". This carrying mechanism is set before the cam by which it is actuated has turned far enough to raise the corresponding lever 154.

The operation of carrying is a repetition of those just described. In all these movements of the totalizing wheels the indicating wheels 187 have, of course followed and the number "1000" is now exposed through the slot 189 in the cover plate. Toward the end of the rotation of the sleeve 88 the eccentric portion of the groove on the inner side of the grooved cam 179 carries the pin 184 outwardly from the shaft 81, oscillating the lever 181 and its shaft 180 with the arm 182 and causing the rod 183 to engage all the locking detents 171 and disengage them from the notches in the rear arms 168 of the three-arm levers 164. While the detents are thus held, the eccentric portion of the groove in the outer face of the grooved cam 179 carries the pin 178 outwardly from the shaft 81, oscillating the bell-crank lever 175 and its shaft 174 with the arm 176 and causing the rod

177 to engage the rear arms 168 of the three-arm levers 164 and restore those that are out of normal position to normal position. Finally, the pins 178 and 184 enter the concentric portions of their respective grooves in the cam, the rod 183 is withdrawn from the detents 171 permitting them to fall into the lower notches 169, the rod 177 is lowered so that it may not interfere with the tilting of the three-arm levers 164 in a subsequent operation, the pins 155 of the levers 154 all drop into the lowest portions of their respective cams 156, and the entire carrying mechanism resumes its normal position as shown in Fig. 3.

The means for printing the total will now be described. (See Figs. 3, 14 and 27.) For this purpose the type-bars 104 and connected mechanism described above in connection with the description of the printing of the items is used, but they are actuated through intermediate devices from a total lever instead of from an item lever.

The gear wheels 103 which mesh with the totalizing wheels 142 and play the part of mere transmission gears in printing the items perform additional functions in the operation of printing the total. (See Fig. 14.) They are mounted on a shaft 190 and each has thirty teeth though, of course, gear wheels with any multiple of ten teeth could be used. Each wheel has three pins 191 extending laterally therefrom and located near the periphery, being one pin for each ten teeth. To set the type-bars to print the total the gear wheels are turned by means of a series of pins 192, one for each gear wheel 103, arranged on a bar 193, which pins may engage a pin 191 on the respective gear wheels 103. The rotation of the gear wheels 103 is in a direction opposite to the direction of their rotation when setting the type-bars to print an item for a reason that will hereinafter appear. Consequently, a set of reversing gears 194 is interposed between the gear wheels 103 and the type bars 104. (See Figs. 3 and 27.) These reversing gears 194 are rotatably mounted on a shaft 195 which is carried by arms 196, 197 loosely mounted on the shaft 190, outside of the frame plates 1, 2, the shaft 195 extending through curved slots in said frame plates. (See Figs. 20, 21, 22 and 23.) On the right hand end of the shaft 190, outside of the frame-plate 2 a disk 198 is rigidly secured and is provided with a notch in its periphery. A pawl 199 is pivoted on the arm 196 and normally engages said notch. The front end of said pawl is inclined or beveled and it is provided with a locking projection 200 on its rear edge. A keeper 201 having a recess toward the disk 198 conforming in shape to the pawl 199 is secured on the frame-plate in such a position that, when the arms 196, 197 have been turned far enough to bring the gears 194 into engagement with their respective type-bars, the pawl 199 will be disengaged from the notch in the disk 198 and the locking projection 200 of the pawl will enter a notch 202 in the keeper. The periphery of the disk 198 bearing on the pawl will hold the pawl in the keeper during the subsequent rotation of the disk and thus, the reversing gears will be firmly held or locked in engagement with the type-bars.

The bar 193 carrying the pins 192 extends through cam slots 203, 204 in the frame-plates 1, 2. The major portion of each of these cam slots is concentric with the shaft 190, disk 198 and gear wheels 103. The upper end, however, curves outwardly from these members.

When the bar 193 is in the concentric portion of the slots its pins 192 may engage the pins 191 on the gear wheels 103. When, however, the bar is in the eccentric portion of the slots its pins 192 are carried out radially beyond reach of the pins 191. Links 205, 206 are connected to the ends of the bar 193. The link 205 is pivotally connected at its lower end to an ear on the disk 198. The link 206 is pivotally connected at its lower end to an arm 207 rigidly mounted on the opposite end of the shaft 190. Thus, by rotation of the disk 198 and shaft 190 the rod 193 may be drawn downwardly being guided by the cam slots 203, 204.

Upon the shaft 190 outside of the disk 198 and arm 196 a disk 208 is rigidly mounted. A portion of its periphery is curved concentrically with the shaft and is provided with teeth 209 forming a segmental gear wheel. It is also provided with a recess 210 having two parallel curved walls concentric with the shaft and inclined end walls. A switch cam 211 is pivoted in said recesses and is provided with similarly inclined surfaces at its opposite ends. At its upper and outer corner the recess terminates in a notch 212; at its lower and inner corner in a notch 213. This disk 208 serves to lower the type-bars for engagement with the reversing gears 194, to disengage the detent 147 from the star wheels 145 of the totalizing wheels 142 and to set the hammers to print.

An arm 214 is rigidly mounted on one end of the shaft 108 which carries the arm 107 for raising, lowering and supporting the front ends of the type-bars 104. A lever 214^a is loosely mounted on the shaft 108 and has a pin engaging one side of said arm 214. (See Fig. 1.) Said lever is provided with a pin 215 which enters the recess 210 in the disk 208. When the parts are in their normal position the pin 215 rests in the notch 213 of said recess 210. The lower end of the lever 214^a, which extends considerably beyond its pin 215, is slotted and engages a pin 216 on one arm of a bell-crank lever 217 secured on the shaft 146 which supports the detents 147. A second arm 218 parallel to the lower arm of said bell-crank lever is secured to the opposite end of said shaft but within the frame. Said arms carry a rod 219 in position to engage the forwardly extending arms 149 of the detent 147 and throw said detents out of engagement with their respective star wheels 145. The segmental gear 209 of said disk 208 meshes with a transmission gear wheel 220 mounted on a stub-shaft secured to the frame. This latter gear wheel meshes with a segmental gear 221 mounted on one arm of a bell-crank lever 222 which is pivoted on the stub-shaft 136. The other arm of said bell-crank lever carries a pin 223 which is in position to engage the arm 135 of the segmental gear 134 which have been described above in describing the printing of the items. Said segmental gear 134 is actuated in the same manner and with like results by the segmental gear 221 and intermediate connections as by the segmental gear 140 and similar intermediate connections. The parts are actuated for the operation of printing the total by a hand lever 224 which is rigidly mounted on the shaft 190.

The operation of the parts involved in printing the total will now be described. This operation includes the operation of clearing the totalizing mechanism. (See Figs. 1 and 3.) When the totalizing mechanism is clear, that is when all the totalizing wheels 142 and

gear wheels 103 are set at "0"; the pins 191 of the gear wheels 103 are so located that the rod 193 with its teeth 192 can travel from one end to the other of its path without engaging any pin 191. When, however, the totalizing mechanism indicates a significant total, the 5 lowest pins 191 on the appropriate gear wheels 103 are displaced upwardly toward the normal position of the rod 193. At the conclusion of the description of the totalizing operation, the totalizing mechanism indicated "1000". Assume that "37" has been added 10 since and that the total is now "1037". The positions of the parts will now be as follows: The units indicating wheel 187 discloses "7" through the slot 189 in the cover plate, a pin 144 of the units totalizing wheel 142 15 is seven teeth in advance of the arm 165 of its respective three-arm lever 164, and a pin 191 of the units gear wheel 103 is three teeth below the highest point a pin 191 may occupy to be engaged by a tooth 192 on the rod 193. The tens indicating wheel 187 discloses "3" 20 through the slot 189 in the cover plate, a pin 144 of the tens totalizing wheel 142 is three teeth in advance of the arm 165 of its respective three-arm lever 164, and a pin 191 of the tens gear wheel 103 is seven teeth below the highest point a pin 191 may occupy to be engaged by a 25 tooth 192 on the rod 193. The hundreds indicating wheel 187 discloses "0" through the slot 189 in the cover plate, the hundreds totalizing wheel 142 has a pin 144 immediately in advance of the arm 165 of its respective three-arm lever 164, and a pin 191 of the hundreds 30 gear wheel 103 is ten teeth below the highest point a pin 191 may occupy to be engaged by a tooth 192 on the rod 193; in other words the wheels in this train occupy their normal positions. The thousands indicating wheel 187 discloses "1" through the slot 189 in the 35 cover plate, the thousands totalizing wheel 142 has a pin 144 just one tooth in advance of the arm 165 of its respective three-arm lever 164, and a pin 191 of the thousands gear wheel 103 is nine teeth below the highest point a pin may occupy to be engaged by a tooth 192 40 on the rod 193. All other parts occupy the positions shown in Figs. 1, 2 and 3. Now pull the handle lever forwardly. This will cause rotation of the shaft 190, disk 208, disk 198 and arm 207. During the initial portion of this movement the pin 215 on the lever 214 en- 45 gages the lower end of the switch-cam 211 and moves the same forwardly. This results in movement of the lever 214, the turning of the shaft 108, the depression of the rear ends of the arms 107 and the rod 109 carried thereby and the lowering of the front ends of the type- 50 bars 104. It also results in the oscillation of the bell-crank lever 217, shaft 146 and arm 218, the depression of the rod 219 carried by said bell-crank lever and said arm, and the disengagement of all the detents 147 from the star wheels 145 leaving all the totalizing wheels 142 55 free to turn. At the same time, the disk 198 has carried the pawl 199 into the keeper 201 and the same is locked therein by said disk and the engagement of the pawl's projection 200 with the keeper's recess 202; and has carried the arm 196 upwardly together with the rod 195 60 carried thereby thus bringing the reversing gear wheels 194 into mesh with the type-bars 104. At the same time the disk 198, and arm 207 with their links 205 and 206 have lowered the rod 193 into the initial part of the concentric portions of the cam grooves 203, 204 and the 65 teeth 192 thereof have been moved rearwardly far

enough to engage any pins 191 of the gear wheels which may be out of the position occupied by them when the wheels are set for zero. The subsequent movement of the parts carries the rod 193 downwardly in the cam slots. When said rod has moved an angular distance 70 equal to that subtended by three teeth of the gear wheels 103, a pin 192 on the rod will engage a pin 191 of the units gear wheel 103 and thereafter that gear wheel will be turned. When the rod 193 has moved through the angular distance subtended by seven teeth of the 75 gear wheels 103, or four teeth further, a pin 192 on the rod will engage a pin 191 on the tens gear wheel thereafter that gear wheel will be turned. When the rod 193 has moved through the angular distance subtended by nine teeth of the gear wheels 103, a pin 192 on said rod 80 will engage a pin 191 on the thousands gear wheel 103 and thereafter that gear wheel will be turned. The total travel of the bar 193 in the concentric portion of the cam slots is the angular distance subtended by ten teeth of the gear wheels 103. Consequently, the units 85 gear wheel 103 will be caused to turn seven teeth, the units totalizing wheel will also turn seven teeth and the units type-bar will be moved rearwardly seven teeth bringing its "7" into printing position. The movements of the tens train will be similar except that the 90 wheels of this train will move three teeth and the "3" of the tens type-bar will be moved into printing position. There will be no movement of the hundreds train as this was set at "0". The movement of the thousands train will be similar to the movement de- 95 scribed for the units train except that the movement will be but one tooth and the "1" of the thousands type-bar will be brought into the printing position. At the end of this operation all the gear-wheels 103, totalizing wheels 142, and indicating wheels 187 are returned to 100 zero position; in other words, the totalizing mechanism is cleared.

It will be noted that the direction of rotation is opposite to the direction of movement induced by throwing items into the total. During this time the segmental 105 gear 209 has transmitted its movement through the gear wheel 220 to the segmental gear 221 on the bell-crank lever 222; and this last in turn transmits its movement through its pin 223 and the arm 135 to the segmental gear 134. Thus, the spring casing 129 is rotated and 110 the hammer actuating spring 130 is wound up; and finally the projection 137 trips the pawl 131 and the hammers 122 are thrown upwardly and strike the row of type in printing position, in exactly the same manner as that described above in detail in describing the 115 printing of an item. The total lever being pushed back, or retracted by a spring if desired, the pin 215 on the lever 214^a engages the upper end of the switch-cam 211 and is moved rearwardly. This moves the arm 214, oscillates the shaft 108 and connected parts and raises 120 the type-bars out of engagement with the reversing gear wheels 194. The type-bars being thus released, they are returned to their normal positions by their springs 113 acting through their bell-crank lever 111. At the same time, the lever 214^a oscillates the bell-crank lever 125 217, raising the rod 219 and permitting the detents to engage their respective star wheels 145, thus locking them in their zero positions. Toward the close of the rearward movement of the total lever the notch of the disk 198 comes beneath the pawl 199 which drops there- 130

into and out of the keeper 201 and thus the arms 196 and 197 with their rod 195 drop, carrying the reversing gears 194 to normal position. The rearward movement of the total lever also restores the hammer mechanism in just the same manner as the return of the item lever restored it which was described above.

The paper and ribbon feed mechanism will now be described. (See Fig. 1.) A rod 225 is mounted in ears on the upper edges of the frame-plates 1, 2. A frame having parallel side-pieces 226, 227 is pivoted on said rod, the front end of said side-pieces resting on stops or lugs 228, 229 on the frame-plates 1, 2. The lug 229 is hook shaped and interlocks with a locking member 230 pivoted on the frame. Said locking member carries a pin 231 which will engage a lug 232 on the side piece 227 and limit the movement of said member when it is turned about its pivot to release the frame. A shaft 233 is mounted in the side pieces of the carriage and carries a cylindrical platen 234. At one end of said platen a ratchet wheel 235 is rigidly mounted on said shaft 233. A feed lever 236 is loosely mounted on said shaft 233 and carries a pawl 237 in position to engage said ratchet wheel 235. A spring 238 bears upon the rear end of the feed lever and holds it normally in its highest position. The amount of oscillation of said lever is limited by the walls of a hole 239 in the adjacent side piece 227 of the frame, a pin 240 on the lever entering said hole. A link 241 is pivotally connected to the front end of the feed lever 236 and extends downwardly to, and is pivotally connected to the rear end of a lever 242 pivoted upon the side of the frame plate 2. This lever 242 extends over the stub-shaft on which the segmental gears 134, 140 and 221 are pivoted. The hub of the arm 135 carrying the segmental gear 134 is shaped to form a disk cam 243. The lever 242 has a downwardly extending projection which bears upon the periphery of said disk cam 243. Thus, whenever, the segmental gear 134 is oscillated, whether by the item lever or the total lever, the lever 242 will be turned on its pivot, its rear end being raised. The paper to be printed upon is arranged in a roll upon a shaft 244 mounted in the frame and extends up the rear of the frame over guide rollers 245, 246, extends through a slot in the rod 225, and then downwardly and around the cylindrical platen 234. Curved paper guides 247 are arranged on the platen frame to guide the paper around the platen. A friction roller 248 bearing upon the front of the platen holds the paper firmly in position.

The ink-ribbon 249 is initially rolled up on a spool 250 pivotally mounted on the frame plate 1. It passes upwardly and over a guide roller 251, over the type 114 of the type-bars 104 and below the platen 234, over a guide roller 252, and winds on a spool 253 on the opposite side of the frame. The last mentioned spool is rotatably mounted on a stub-shaft 254 on the frame plate 2 and has a ratchet wheel 255 rigidly connected to it. A lever 256 is pivotally mounted on the same stub-shaft 254 and carries a feed pawl 257 which is arranged in position to engage said ratchet wheel 255. The front end of the lever 256 is connected to a spring 258 hung on a pin secured in the frame-plate 2, which spring holds the front end of the lever up. At its rear end, the lever 256 carries a pin 259 which rests in a slot in the end of a link 260 pivoted on the end of the lever 242, the links 241 and 260 being mounted on the same pivot.

The operation of feeding the paper and ink-ribbon will now be described. (See Fig. 1.) Whenever, the segmental gear 134 is rotated the cam 243 will raise the lever 242. This raises the link 241, the front end of the paper feed lever 236 and the paper-feed pawl 237, thus turning the platen 234 through the angle subtended by the desired space between items on the paper. At the same time, the link 260 is raised by the lever 242. This raises the rear end of the lever 256 and depresses the front end thereof carrying the pawl 257 downwardly so that it can engage the next tooth of the ratchet wheel 255. These movements occur while the hammer actuating spring 130 is being set and before the hammers have caused the impression of the type on the paper, this function being performed, as explained above, at the very end of the downward movement of the item lever and before its return movement has begun. When the segmental gear 134 and connected cam 243 return to initial position the lever 242 is permitted to resume its normal position. The spring 258 can now raise the front end of the lever 256 and the pawl 257 turns the ratchet wheel 255 and spool 253 one tooth thus winding the ribbon on the spool 253 and off the spool 250. The spring 238 can also return the paper feed lever 236 to normal position and this permits its pawl 237 to drop down and engage a new tooth on the ratchet wheel 235 and be in position to turn the ratchet wheel when the printing mechanism is again actuated.

For use when the wrong number has been set up in the item mechanism and it is desired to clear said mechanism without operating the totalizing mechanism, the following arrangement is provided. (See Figs. 2 and 15.) A plate 261 is pivotally mounted on a stub-shaft 262 secured to the frame plate 1 and is arranged near the lower end of the link 65 through which the item wheel carriage is tilted to bring the item wheels into mesh with the totalizing wheels. The plate 261 is provided with a cam-slot 263 into which extends a pin 264 mounted on the link 65. A handle 265 is rigidly connected to the plate 261 and by it the plate can be oscillated. The front edge of the plate 261 is provided with notches which may be engaged by a detent 266 to hold the plate either up or down.

When it is desired to clear the item mechanism without actuating the totalizing mechanism, the handle 265 is pushed rearwardly. This raises the front end of the plate 261 and the pin 264 and lower end of the link 65 are moved forwardly far enough to disengage the pin 67 from the arm 64 secured on the shaft 61. Now, if the item lever be operated the shaft 61 and arm 64 will oscillate idly and the item wheel carriage will not be tilted or raised. The rack 79 of the item lever will, however, actuate the gear wheels 77, 78 and cause the rotation of the sector 74. The shaft 81 and its sleeve 88 will also be caused to rotate as explained hereinbefore. Thus the item mechanism will be cleared in the same manner as if the movement of the item wheels were being transmitted to the totalizing wheels. The handle 265 may then be pulled forward and the machine will be adjusted as before to perform the totalizing operation when the item lever is operated.

Obviously, the machine is capable of modification with the scope of my invention and therefore I do not wish to be limited to the specific construction shown and described.

What I claim as my invention and desire to secure by Letters Patent is:

1. An adding machine comprising item mechanism having item wheels capable of being set to correspond to a number to be added, totalizing mechanism normally out of operative connection with said item mechanism and having a series of totalizing wheels, means to bring said mechanisms into operative connection after said item mechanism has been set to correspond to the number to be added and to clear said item mechanism thereby throwing the number to be added into the totalizing mechanism, means for locking each of said totalizing wheels respectively and means for unlocking such of the totalizing wheels as are to be actuated.
2. An adding machine comprising item mechanism having item wheels capable of being set to correspond to a number to be added, totalizing mechanism normally out of operative connection with said item mechanism, and means to impart lateral movement to said item wheels to set them and means for moving said item mechanism transversely to said setting movement to bring said mechanisms into operative connection after said item wheels have been set to correspond to the number to be added.
3. An adding machine comprising item mechanism having a series of item wheels capable of being set to correspond to a number to be added, totalizing mechanism normally out of operative connection with said item mechanism, means to impart lateral movement to said series of item wheels to set them and means for moving said item mechanism transversely to said setting movement to bring said mechanisms into operative connection after said item wheels have been set to correspond to the number to be added, and means to clear said item mechanism and thereby throw the number to be added into the totalizing mechanism.
4. An adding machine comprising a series of item wheels, there being one item wheel for each order within the capacity of the machine, totalizing mechanism having a series of totalizing wheels, there being one totalizing wheel for each order within the capacity of the machine, said series of item wheels and totalizing wheels being normally laterally displaced with respect to each other, means to set said item mechanism to represent any number, means to move said series of item wheels laterally and means to move them transversely to bring a number of item wheels equal to the order of number represented by said item wheels into operative relation respectively with an equal number of totalizing wheels and means to restore said item wheels to normal position, the rotatory portion of said restoring movement being imparted to the respective totalizing wheels.
5. An adding machine comprising a series of item wheels, a series of totalizing wheels, said wheels being all uniformly spaced apart laterally and said series of item wheels being located to one side of the totalizing wheel representing the lowest order, a plurality of keys representing, respectively, the digits, means to operatively connect said keys with said item wheels in succession to induce rotation of said item wheels proportional to the number represented by the respective keys and to bring the item wheel corresponding to the last key operated into the plane of the totalizing wheel representing the lowest order and the item wheels corresponding to the other keys operated into the plane of the totalizing wheels representing succeeding higher orders, and means to impart to said item wheels a movement transverse to the setting movement to bring them into engagement with such totalizing wheels and to impart proportional movement to said totalizing wheels.
6. An adding machine comprising a plurality of rotatable and laterally movable item wheels, a like plurality of totalizing wheels, a plurality of keys representing the digits, respectively, means operatively connecting said keys with said item wheels in succession to induce rotation of the item wheels proportional to the digits represented by the respective keys and to induce lateral movement of said item wheels proportional to the number of keys operated, means to bring a number of item wheels proportional to the number of times keys are operated into the planes of an equal number of totalizing wheels, and

means to impart to said item wheels a movement transverse to the setting movement to bring them into engagement with such totalizing wheels and to impart proportional movement to said totalizing wheels.

7. An adding machine comprising item mechanism comprising keys indicating respectively the digits, a plurality of rotatable and laterally movable item wheels, and means whereby rotation and lateral movement of said item wheels may be induced by said keys, totalizing mechanism normally out of operative connection with said item mechanism, and means to move said item mechanism into operative connection with said totalizing mechanism and to transmit movement to said totalizing mechanism through said item mechanism.

8. An adding machine comprising item mechanism comprising keys indicating respectively the digits, a plurality of item wheels, means whereby any of said keys may induce rotation of said item wheels proportional to the digit represented by the key and may induce lateral movement of all of said item wheels, totalizing mechanism normally out of operative connection with said item mechanism and means to move said item mechanism into operative connection with said totalizing mechanism and to transmit movement to said totalizing mechanism through said item mechanism.

9. An adding machine comprising item mechanism comprising keys indicating respectively the digits, a plurality of item wheels, means whereby rotation of said item wheels in succession may be induced by any of said keys except one, and means whereby lateral movement of said plurality of item wheels may be induced by any of said keys, totalizing mechanism normally out of operative connection with said item mechanism, and means to move said item mechanism into operative connection with said totalizing mechanism and to transmit movement to said totalizing mechanism through said item mechanism.

10. An adding machine comprising item mechanism comprising keys indicating respectively the digits, a plurality of item wheels, means whereby rotation of said item wheels in succession may be induced by certain of said keys, and means whereby lateral movement of all said item wheels may be induced whenever rotation of any one of said wheels occurs, totalizing mechanism normally out of operative connection with said item mechanism, and means to move said item mechanism into operative connection with said totalizing mechanism and to transmit movement to said totalizing mechanism through said item mechanism.

11. An adding machine comprising item mechanism comprising a carriage, item wheels rotatably mounted in said carriage, a plurality of keys representing, respectively, the digits, means to induce rotation of said item wheels individually arranged to be operated by certain of said keys, said carriage and said means being relatively laterally movable to bring said item wheels successively into operative relation to said means, and means to induce the relative lateral movement of said carriage and said means operatively connected to said keys, totalizing mechanism normally out of operative connection with said item mechanism, and means to move said item mechanism into operative connection with said totalizing mechanism and to transmit movement to said totalizing mechanism through said item mechanism.

12. An adding machine comprising item mechanism comprising keys indicating, respectively, the digits, a series of rotatable and laterally movable item wheels, means to induce rotation of said item wheels in succession and normally in position to cooperate with the item wheel at one end of said series, and means to induce relative movement of said means and said series of item wheels to bring said means into position to cooperate with another of said item wheels, both said means being operatively connected to said keys, totalizing mechanism normally out of operative connection with said item mechanism, and means to move said item mechanism into operative connection with said totalizing mechanism and to transmit movement to said totalizing mechanism through said item mechanism.

13. An adding machine comprising item mechanism comprising keys indicating respectively the digits, a series of rotatable and laterally movable item wheels, the item wheel

at one end of said series being normally in position to be actuated, and means whereby any of said keys may induce rotation of said item wheel proportional to the number indicated by the key and said series of item wheels may be moved laterally to bring the item wheel adjacent said end item wheel into position to be actuated, totalizing mechanism normally out of operative connection with said item mechanism and means to move said item mechanism into operative connection with said totalizing mechanism and to transmit movement to said totalizing mechanism through said item mechanism.

14. An adding machine comprising a series of rotatable item wheels, means tending to turn said item wheels, means to normally hold said item wheels against rotation, a plurality of keys, means operatively connected to said keys to release said item wheels in succession from said holding means, means operatively connected to said keys to limit rotation of said item wheels when released, said series of item wheels and said means to limit the rotation of said item wheels being relatively laterally movable, and means operatively connected to said keys to induce said relative movement, totalizing mechanism normally out of operative connection with said item mechanism, and means to bring said item mechanism and totalizing mechanism into operative connection and to transmit movement to said totalizing mechanism through said item mechanism.

15. An adding machine comprising a laterally movable carriage, rotatable item wheels mounted in said carriage, a plurality of keys representing the digits, means operatively connecting said keys to said item wheels in succession to induce rotation of the item wheels proportional to the respective keys operated, and means operatively connecting said keys to said carriage to induce lateral movement thereof when any key is operated, totalizing mechanism normally out of operative connection with said item mechanism, and means to move said item mechanism into operative connection with said totalizing mechanism and to transmit movement to said totalizing mechanism through said item mechanism.

16. An adding machine comprising item mechanism comprising a laterally movable carriage, item wheels rotatably mounted in said carriage, each provided with a stop, a series of movable stops arranged to cooperate with said stops of said item wheels in succession, a plurality of keys representing respectively the digits, means operatively connecting certain of said keys and said adjustable stops, and means to impart lateral movement to said carriage arranged to be operated by any of said keys, totalizing mechanism normally out of operative connection with said item mechanism, and means to bring said item mechanism and totalizing mechanism into operative connection and to transmit movement to said totalizing mechanism through said item mechanism.

17. An adding machine comprising item mechanism comprising a laterally movable carriage, item wheels rotatably mounted in said carriage, means tending to turn said item wheels, means normally holding said item wheels against rotation, a plurality of keys, means operatively connected to said keys to release said item wheels in succession from said holding means, means operatively connected to said keys to limit the rotation of said item wheels when released and means operatively connected to said keys to induce lateral movement of said carriage, totalizing mechanism normally out of operative connection with said item mechanism, and means to bring said item mechanism and totalizing mechanism into operative connection and to transmit movement to said totalizing mechanism through said item mechanism.

18. An adding machine comprising item mechanism comprising a carriage, item wheels rotatably mounted in said carriage, springs connected to said item wheels to individually rotate the same, detents arranged to normally hold said item wheels against rotation, a plurality of keys representing respectively the digits, means to disengage the said detents individually from said item wheels arranged to be operated by certain of said keys, means to limit the rotation of the item wheels when so released arranged to be operated by certain of said keys, said carriage being laterally movable to bring said detents and

said item wheels successively into operative relation to said means respectively, and means to induce such lateral movement arranged to be operated by any of said keys, totalizing mechanism normally out of operative connection with said item mechanism and means to bring said item mechanism and totalizing mechanism into operative connection and to transmit movement to said totalizing mechanism.

19. An adding machine comprising item mechanism comprising a carriage, item wheels rotatably mounted in said carriage, springs connected to said item wheels to individually rotate the same, independently movable detents arranged to normally hold said item wheels to individually rotate the same, independently movable detents arranged to normally hold said item wheel against rotation, a plurality of keys representing respectively the digits, a detent disengaging rod operatively connected to all of said keys except the zero key, a plurality of movable stops to limit the rotation of said item wheels respectively operatively connected to said keys, there being one stop for each key except the zero key, said carriage being laterally movable to bring said detents successively and individually into operative relation to said detent-disengaging rod and to bring said item wheels successively and individually into operative relation to said movable stops, and means to induce lateral movement of said carriage operatively connected to all said keys, totalizing mechanism normally out of operative connection with said item mechanism, and means to bring said item mechanism and totalizing mechanism into operative connection and to transmit movement to said totalizing mechanism through said item mechanism.

20. An adding machine comprising a plurality of item members, ten keys representing respectively the ten digits, means operatively connected to said keys to induce movement of said item members individually in proportion to the digits represented by the keys operated, a series of totalizing wheels, means operatively connected to said keys to move said item members laterally in unison, the item member corresponding to the last key operated being brought into position to cooperate with the totalizing wheel representing the lowest order, a spring retracted manually operable item lever arranged to have oscillating movement, means operatively connected to said item lever to engage and move said item members to their normal rotary position during the initial stroke of said lever, and means operatively connected to the returning spring of said lever to engage and move said item members back to their normal lateral position during the return stroke of said lever.

21. An adding machine comprising item mechanism having laterally movable item members mounted on a pivoted member, totalizing mechanism normally out of operative connection with said item mechanism, and means to oscillate said pivoted member to bring said mechanism into operative connection, said means having a device for restoring the item mechanism to normal and for transferring to said totalizing mechanism the restoring movement of the item mechanism.

22. An adding machine comprising item mechanism having a plurality of laterally movable item wheels capable of being operated individually and means for restoring the item wheels to normal, and a pivoted member upon which said item wheels are mounted, totalizing mechanism having a plurality of totalizing wheels, said totalizing wheels and said item wheels being normally out of gear, means to oscillate said pivoted member and thereby directly throw said item wheels and said totalizing wheels into gear, said wheels remaining in gear from the beginning to the end of the rotary return movement of the item wheels.

23. An adding machine comprising a carriage arranged to have oscillating movement, a plurality of item wheels rotatably mounted in said carriage, means to set said item wheels to correspond to a number to be added, totalizing mechanism normally out of operative connection with said item wheels and means to oscillate said carriage to bring only such of said item wheels as may have been set into operative connection with said totalizing mechanism.

24. An adding machine comprising a carriage arranged

to have oscillatory and lateral movement, a plurality of item wheels rotatably mounted in said carriage, keys representing the digits, respectively, operatively connected to said carriage and item wheels to set said wheels to correspond to a number to be added, totalizing mechanism normally out of operative connection with said item wheels, and means to oscillate said carriage and throw so many of said item wheels, as are required to represent the number to be added into gear with said totalizing mechanism.

25. An adding machine comprising a carriage arranged to have oscillatory and lateral movement, a plurality of item wheels rotatably mounted in said carriage, keys representing the digits, respectively, operatively connected to said carriage and said item wheels to set said item wheel to correspond to a number to be added, totalizing mechanism comprising a plurality of totalizing wheels, said item wheels and totalizing wheels being normally out of gear, and means to throw so many of said item wheels as are required to represent the number to be added into gear with a like number of said totalizing wheels.

26. An adding machine comprising a carriage arranged to have oscillatory movement, a plurality of item wheels rotatably mounted in said carriage, means to set said item wheels to correspond to a number to be added, totalizing mechanism normally out of operative connection with said item wheels, an item lever, means connecting said lever and said carriage to oscillate the latter during the initial portion of a stroke of said lever and throw said item wheels into operative connection with said totalizing mechanism, and means connecting said lever and said item wheels to rotate the latter and restore them to normal position after said carriage has been oscillated.

27. An adding machine comprising a carriage arranged to have oscillatory and lateral movement, a plurality of rotatable item wheels in said carriage, means to set said wheels to correspond to a number to be added, totalizing mechanism normally out of operative connection with said item wheels, an item lever, means operatively connected to said item lever to oscillate said carriage during the initial portion of the stroke of said lever and means operatively connected to said item lever to subsequently rotate said item wheels into their normal positions.

28. An adding machine comprising a carriage arranged to have lateral and pivotal movement, a plurality of rotatable item wheels in said carriage, means to set said item wheels to correspond to a number to be added, totalizing mechanism normally out of operative connection with said item wheels, an item lever, means operatively connected to said item lever to impart pivotal movement to said carriage during the initial portions of the initial and return strokes of said lever and means operatively connected to said item lever to rotate said item wheels into their normal positions in the interval between said pivotal movements of said carriage.

29. An adding machine comprising a pivoted laterally movable carriage, a series of item wheels rotatably mounted in said carriage, keys representing the digits, respectively, operatively connected to said item wheels to set the same to represent a number to be added, means operatively connected to said keys to induce lateral movement of said carriage during the setting operation, totalizing mechanism normally out of operative connection with said item wheels, an item lever, means to move said carriage pivotally during the initial portion of the initial and return strokes of said lever, means to rotate said item wheels into their normal positions in the interval between the pivotal movements of said carriage and means to move said carriage laterally to normal position after the pivotal movement of said carriage occurring during the return stroke of said lever.

30. An adding machine comprising item mechanism comprising a plurality of keys representing the digits, respectively, and item wheels arranged to be successively set to represent the numbers represented by the respective keys operated, totalizing mechanism, normally out of operative relation to said item mechanism, printing mechanism continuously operatively connected to said totalizing mechanism, and means to restore said item wheels to normal position and simultaneously to move said item mechanism into operative connection with said totalizing mechanism and throw the item into the totalizing mechanism and to print the item.

31. An adding machine comprising item mechanism comprising keys representing, respectively, the digits, and item wheels arranged to be successively set by said keys to represent the numbers represented by the respective keys operated, printing mechanism comprising movable type-bars, type movably mounted in said type-bars and means to actuate said type, and means operatively connecting said item wheels and said type-bars to transmit to said type-bars movement proportional to the movement of said item wheels.

32. An adding machine comprising item mechanism comprising keys representing, respectively, the digits and item wheels arranged to be successively set to correspond to the numbers represented by the respective keys operated, printing mechanism comprising movable type-bars, type vertically movable in said type-bars, there being in each bar a type for each digit and means to simultaneously actuate a transverse row of type including one type of each of a plurality of said type-bars, and means operatively connecting said item wheels and said type-bars to transmit to said type-bars movement proportional to the movement of said item wheels.

33. An adding machine comprising totalizing mechanism, item mechanism mounted to have oscillatory movement, said mechanisms being normally out of operative connection, means to oscillate said item mechanism into operative connection with said totalizing mechanism and means to render said means ineffective.

34. An adding machine comprising a carriage arranged to have oscillatory movement, a plurality of item wheels rotatably mounted in said carriage, means to set said item wheels to correspond to a number to be added, totalizing mechanism normally out of operative connection with said item wheels, means to oscillate said carriage and throw said item wheels into gear with said totalizing mechanism, means to subsequently actuate said item wheels, and means to render said oscillating means ineffective.

35. An adding machine comprising a carriage arranged to have oscillatory movement, a plurality of item wheels rotatably mounted in said carriage, means to set said item wheels to correspond to a number to be added, totalizing mechanism normally out of operative connection with said item wheels, an item lever, means connecting said lever and said carriage to oscillate the latter, and throw said item wheels into gear with said totalizing mechanism, means connecting said lever and said item wheels to rotate the latter, and manually operable means to render said oscillating means ineffective.

36. An adding machine comprising item mechanism, totalizing mechanism, printing mechanism, said totalizing and printing mechanisms being normally out of operative connection with said item mechanism, means to bring said totalizing and printing mechanisms into operative connection with said item mechanism and means to render said means ineffective.

37. An adding machine comprising a series of item wheels, totalizing mechanism, said totalizing mechanism and item wheels being normally out of gear, means to set said item wheels to correspond to a number to be added without affecting said totalizing mechanism, an item lever, means actuated by said item lever to throw said item wheels and said totalizing mechanism into gear, means subsequently actuated by said item lever to restore said item wheels to normal position and manually operable means to render inoperative said means to throw said item wheels and said totalizing mechanism into gear.

38. An adding machine comprising totalizing mechanism having a plurality of totalizing wheels, a series of item wheels normally out of gear with said totalizing wheels, means to set said item wheels to correspond to a number to be added without affecting said totalizing mechanism, a plurality of gear wheels, in gear, respectively, with said totalizing wheels, a plurality of type bars an item lever, means actuated by said item lever to simultaneously throw said item wheels into gear with said totalizing wheels and said type-bars into gear with said gear wheels, means subsequently actuated by said item lever to restore said

150
155
160

item wheels to normal position and manually operable means to render inoperative said means to throw into gear parts normally out of gear.

39. An adding machine comprising totalizing mechanism 5 having a plurality of totalizing wheels, means to introduce items into said totalizing mechanism, a plurality of gear wheels in gear, respectively, with said totalizing wheels, and printing mechanism comprising a plurality of type-bars arranged to be thrown into gear with said gear 10 wheels by said means to introduce items into said totalizing mechanism.

40. An adding machine comprising totalizing mechanism having a plurality of totalizing wheels, item mechanism 15 comprising item wheels normally out of gear with said totalizing wheels, a plurality of gear wheels in gear, respectively, with said totalizing wheels, printing mechanism comprising type-bars normally out of gear with said gear wheels, and means to simultaneously throw into gear said 20 item wheels and totalizing wheels and said gear wheels and type-bars and subsequently impart rotatory movement to said item wheels.

41. An adding machine comprising totalizing mechanism, means to introduce items into said totalizing mechanism, 25 printing mechanism arranged to be set to correspond to the items through said totalizing mechanism and means to clear said totalizing mechanism and thereby set said printing mechanism to correspond to the total.

42. An adding machine comprising totalizing mechanism, means to introduce items into said totalizing mechanism, 30 printing mechanism operatively connected to said totalizing mechanism to be set to correspond to the items, means to clear said totalizing mechanism by movements thereof in a direction opposite to the direction of movement when items are introduced and means to transmit 35 the clearing movement of said totalizing wheels to said printing mechanism to set the same to correspond to the total.

43. An adding machine comprising totalizing mechanism having a plurality of totalizing wheels, a plurality of 40 clearing gear wheels in gear, respectively, with said totalizing wheels, reversing gear wheels in gear, respectively, with said clearing gear wheels, printing mechanism comprising a plurality of type-bars, means to introduce items into said totalizing mechanism and throw said type-bars 45 into gear with said clearing gears, and means cooperating with said clearing gear wheels to clear said totalizing mechanism, and throw said type-bars and said reversing gear wheels into gear.

44. In an adding machine, totalizing mechanism comprising a series of totalizing wheels, means to hold said 50 totalizing wheels against rotation, a carrying train arranged between each totalizing wheel and the adjacent totalizing wheel of the next higher order, and means to actuate said carrying trains successively, each of said 55 carrying trains being permanently connected to said actuating means and comprising a member adapted to release said holding means and to engage with the totalizing wheel of higher order to actuate the same but being actuated normally out of engagement therewith.

45. In an adding machine, totalizing mechanism comprising a series of totalizing wheels, means to hold said 60 totalizing wheels against rotation, a carrying train arranged between the totalizing wheel and the adjacent totalizing wheel of the next higher order, said trains being normally ineffective to release and to carry, means 65 on said totalizing wheels to set the respective carrying trains in position to carry and means to actuate said carrying trains successively, each carrying train being permanently connected to said actuating means and comprising a member adapted to release said holding means 70 and to engage with the totalizing wheel of higher order to actuate the same but being normally out of engagement therewith when actuated.

46. An adding machine comprising an item mechanism, 75 totalizing mechanism comprising a series of totalizing wheels, a carrying train arranged between each totalizing wheel and the adjacent totalizing wheel of the next higher order, said trains being normally ineffective to carry when actuated, means on said totalizing wheels to 80 set their respective carrying trains in position to carry

when actuated, a lever operatively connected to said item mechanism to introduce items into said totalizing mechanism upon the initial stroke thereof, and means to actuate said carrying trains in succession arranged to operate 85 upon the return stroke of said lever said carrying trains being permanently connected to said actuating means.

47. An adding machine comprising an item mechanism, totalizing mechanism comprising a series of totalizing 90 wheels, means to hold said totalizing wheels against rotation, a carrying train arranged between each totalizing wheel and the adjacent totalizing wheel of the next higher order and having means to release said holding means for the totalizing wheel of the higher order, said releasing means being normally ineffective to release when 95 operated a lever operatively connected to said item mechanism to introduce items into said totalizing mechanism upon the initial stroke thereof, and means to actuate said carrying trains in succession arranged to operate upon the return of said lever.

48. An adding machine comprising an item mechanism, totalizing mechanism comprising a series of totalizing 100 wheels, means to hold said totalizing wheels against rotation, a carrying train arranged between each totalizing wheel and the adjacent totalizing wheel of the next higher order and having means to release said holding means for 105 the totalizing wheel of the higher order, a lever operatively connected to said item mechanism to introduce items into said totalizing mechanism upon the initial stroke thereof, and means to actuate said carrying trains in succession arranged to operate upon the return stroke 110 of said lever, each of said trains being permanently connected to said actuating means, and comprising a member adapted to engage with the totalizing wheel of the higher order to actuate the same but which is actuated normally out of engagement therewith, said member being 115 arranged to be brought into operative position by said setting means.

49. In an adding machine, totalizing mechanism comprising a series of totalizing wheels, a carrying train arranged between each totalizing wheel and the adjacent 120 totalizing wheel of the next higher order, said trains being normally ineffective to carry when actuated, means to lock said trains in both normal and set positions and to keep them locked during the actuation of said train, means to set said carrying trains in position to carry and 125 means to actuate said carrying trains successively.

50. In an adding machine, totalizing mechanism comprising a series of totalizing wheels, a carrying train arranged between each totalizing wheel and the adjacent 130 totalizing wheel of the next higher order, said trains being normally ineffective to carry when actuated, means to set said carrying trains in position to carry when actuated, means to lock said trains in said normal position and when in position to carry and to keep them locked 135 during the carrying operation and means to actuate said carrying trains subsequently.

51. In an adding machine, totalizing mechanism comprising a series of totalizing wheels, a carrying train arranged between each totalizing wheel and the adjacent 140 totalizing wheel of the next higher order, said trains being normally ineffective to carry when actuated, means to set said carrying trains in position to carry when actuated, means to lock said trains in said normal position and when in position to carry and to keep them locked 145 during the carrying operation and means to actuate said carrying trains subsequently, and to subsequently release said locking means.

52. In an adding machine, totalizing mechanism comprising a series of totalizing wheels, a carrying train arranged between each totalizing wheel and the adjacent 150 totalizing wheel of the next higher order, said trains being normally ineffective to carry when actuated, means to set said carrying trains in position to carry when actuated, means to lock said trains in said normal position and when in position to carry and to keep them locked 155 during the carrying operation, means to actuate said carrying trains subsequently, and to subsequently release said locking means, and means to restore said carrying trains to their normal ineffective positions.

53. In an adding machine, totalizing mechanism com- 160

prising a series of totalizing wheels, a carrying train arranged between each totalizing wheel and the adjacent totalizing wheel of the next higher order, said trains being normally ineffective to carry when actuated, means on

5 said totalizing wheels to set said carrying trains in position to carry, means to lock said trains in said normal position and when in position to carry and to keep them locked during the carrying operation and means to actuate said carrying trains successively.

10 54. In an adding machine totalizing mechanism comprising a series of totalizing wheels, a carrying train arranged between each totalizing wheel and the adjacent totalizing wheel of the next higher order and comprising a feed pawl normally out of engagement with said totalizing

15 wheel of the higher order and a set pawl operatively connected to said feed pawl to positively actuate the same, means on the totalizing wheel of the lower order to positively actuate said set pawl and thereby positively move said feed pawl into engagement with its respective totalizing wheel, and means to actuate said carrying trains successively.

20 55. In an adding machine, totalizing mechanism comprising a series of totalizing wheels, a detent for each totalizing wheel to hold the same against rotation, a carrying train arranged between each totalizing wheel and

25 the totalizing wheel of the next higher order and provided with means to release said detent for the latter wheel, said means being normally in ineffective position, means operatively connected to said totalizing wheel of the lower order to set said detent releasing means in effective position, and means to successively actuate said carrying trains.

30 56. In an adding machine, totalizing mechanism comprising a series of totalizing wheels, a detent for each totalizing wheel to hold the same against rotation, a carrying train arranged between each totalizing wheel and the totalizing wheel of the next higher order, and comprising a feed pawl to advance the totalizing wheel of the next higher order one tooth, means to release said detent of the last mentioned totalizing wheel, said feed pawl and

40 said detent-disengaging means being normally in ineffective position and a set pawl operatively connected to said totalizing wheel of the lower order to set said feed pawl and said means in their effective positions and means to successively actuate said carrying train.

45 57. In an adding machine, totalizing mechanism comprising a series of totalizing wheels, a detent for each totalizing wheel to hold the same against rotation, a carrying train arranged between each totalizing wheel and

50 the totalizing wheel of the next higher order, and comprising a feed pawl to advance the totalizing wheel of the next higher order one tooth, means to release said detent of the last mentioned totalizing wheel, said feed pawl and said detent-disengaging means being normally ineffective position, and a set pawl, means on said totalizing wheel of the lower order to trip said set pawl to set said feed pawl and said means in their effective positions, and means to successively actuate said carrying trains.

55 58. In an adding machine, totalizing mechanism comprising a series of totalizing wheels, a detent for each totalizing wheel to hold the same against rotation, a carrying train arranged between each totalizing wheel and the totalizing wheel of the next higher order, and comprising a feed pawl to advance the totalizing wheel of the next higher order one tooth, means to release said detent of the last mentioned totalizing wheel, said feed pawl and

60 said detent-disengaging means being normally ineffective position, and a set pawl, means on said totalizing wheel of the lower order to trip said set pawl to set said feed pawl and said means in their effective positions, means to successively actuate said carrying trains, and means to reset said feed pawl and said detent-disengaging means in their ineffective positions.

65 59. An adding machine comprising item mechanism, means to introduce items into the totalizing mechanism, totalizing mechanism comprising a series of totalizing wheels, a carrying train arranged between each totalizing wheel and the totalizing wheel of the next higher order, and a plurality of actuating cams respectively operatively

70 connected to said carrying trains and timed to actuate said trains successively, and a spring to simultaneously

actuate said cams arranged to be set by said means to introduce items into the totalizing mechanism.

60. An adding machine comprising item mechanism, an item lever operatively connected to said item mechanism, totalizing mechanism comprising a plurality of totalizing wheels, a carrying train arranged between each totalizing wheel and the totalizing wheel of the next higher order and having a supporting lever, a sleeve, a plurality of

85 cams mounted on said sleeve and respectively operatively connected to said supporting levers to raise and lower the same, and a spring arranged to be wound up on the initial stroke of said item lever and operatively connected to said sleeve to rotate the same during the return stroke of said item lever.

90 61. In an adding machine, item mechanism comprising keys indicating, respectively, the digits, a plurality of rotatable and laterally movable item wheels, springs for the respective item wheels tending to rotate them from normal position and means whereby rotation and lateral movement of said item wheels may be induced by said keys.

95 62. In an adding machine, item mechanism comprising keys indicating, respectively, the digits, a plurality of item wheels, springs for the respective item wheels tending to rotate them from normal position, means whereby any of said keys may induce rotation of said item wheels proportional to the number indicated by the key and may induce lateral movement of all of said item wheels.

100 63. In an adding machine, item mechanism comprising keys indicating, respectively, the digits, a series of rotatable and laterally movable item wheels, springs for the respective item wheels tending to rotate them from normal position, the item wheel at one end of said series being normally in position to be actuated and means whereby any of said keys may induce rotation of said item wheel proportional to the number indicated by the key and said series of item wheels may be moved laterally to bring the item wheel adjacent to said end item wheel into position to be actuated.

105 64. In an adding machine, item mechanism comprising keys indicating respectively, the digits, a plurality of item wheels, springs for the respective item wheels tending to rotate them from normal position, means whereby rotation of said item wheels in succession may be induced by any of said keys except one, and means whereby lateral movement of said plurality of item wheels may be induced by any of said keys.

110 65. In an adding machine, item mechanism comprising keys, indicating respectively the digits, a plurality of item wheels, springs for the respective item wheels tending to rotate them from normal position, means whereby rotation of said item wheels in succession may be induced by certain of said keys, and means whereby lateral movement of all said item wheels may be induced whenever rotation of any one of said wheels occurs.

115 66. In an adding machine, item mechanism comprising keys indicating, respectively, the digits, a series of rotatable and laterally movable item wheels, springs for the respective item wheels tending to rotate them from normal position, means to induce rotation of said item wheels in succession and normally in position to cooperate with the item wheel at one end of said series, and means to induce relative movement of said means and said series of item wheels to bring said means into position to cooperate with another of said item wheels, both said means being operatively connected to said keys.

120 67. In an adding machine, item mechanism comprising a carriage, springs for the respective item wheels tending to rotate them from normal position, item wheels rotatably mounted in said carriage, a plurality of keys representing, respectively, the digits, means to induce rotation of said item wheels individually arranged to be operated by certain of said keys, said carriage and said means being relatively laterally movable to bring said item wheels successively into operative relation to said means, and means to induce the relative lateral movement of said carriage and said means operatively connected to said keys.

125 68. In an adding machine, item mechanism comprising a laterally movable carriage, spring actuated item wheels rotatably mounted in said carriage, a plurality of keys

representing the digits, means operatively connecting said keys to said item wheels in succession to induce rotation of the item wheels proportional to the respective keys operated, and means operatively connecting said keys to said carriage to induce lateral movement thereof when any key is operated.

69. In an adding machine, item mechanism comprising a series of rotatable item wheels, means normally tending to turn said item wheels from normal position, means to normally hold said item wheels against rotation, a plurality of keys, means operatively connected to said keys to release said item wheels in succession from said holding means, means operatively connected to said keys to limit the rotation of said item wheels when released, said series of item wheels and said means to limit the rotation of said item wheels being relatively laterally movable and means operatively connected to said keys to induce said relative lateral movement.

70. In an adding machine, item mechanism comprising a laterally movable carriage, item wheels rotatably mounted in said carriage, means tending to turn said item wheels, means normally holding said item wheels against rotation, a plurality of keys, means operatively connected to said keys to release said item wheels in succession from said holding means, means operatively connected to said keys to limit the rotation of said item wheels when released and means operatively connected to said keys to induce lateral movement of said carriage.

71. In an adding machine, item mechanism comprising a laterally movable carriage, item wheels rotatably mounted in said carriage and each provided with a stop, a series of adjustable stops arranged to cooperate with said stops of said item wheels in succession, a plurality of keys representing respectively the digits, means operatively connecting certain of said keys and said adjustable stops, and means to impart lateral movement to said carriage arranged to be operated by any of said keys.

72. In an adding machine, item mechanism comprising a carriage, item wheels rotatably mounted in said carriage, springs connected to said item wheels to individually rotate the same, detents arranged to normally hold said item wheels against rotation, a plurality of keys representing, respectively, the digits, means to disengage said detents individually from said item wheels arranged to be operated by certain of said keys, means to limit the rotation of the item wheels when so released arranged to be operated by certain of said keys, said carriage being laterally movable to bring said detents and said item wheels successively into operative relation to said means respectively, and means to induce such lateral movement arranged to be operated by any of said keys.

73. In an adding machine, item mechanism comprising a carriage, item wheels rotatably mounted in said carriage, springs connected to said item wheels to individually rotate the same, detents arranged to normally hold said item wheels against rotation, a plurality of keys representing, respectively, the digits, means to disengage the detents individually from their respective item wheels operatively connected to certain of said keys, a plurality of movable stops to limit the movement of said item wheels respectively operatively connected to said keys, said carriage being laterally movable to bring said detents successively into operative relation to said disengaging means and said item wheels successively into operative relation to said movable stops, and means to induce lateral movement of said carriage operatively connected to said keys.

74. In an adding machine, item mechanism comprising a carriage, item wheels rotatably mounted in said carriage, springs connected to said item wheels to individually rotate the same, independently movable detents arranged to normally hold said item wheels against rotation, a plurality of keys representing, respectively, the digits, a detent-disengaging rod operatively connected to all of said keys except the zero key, a plurality of movable stops to limit the rotation of said item wheels respectively operatively connected to said keys, there being one stop for each key except the zero key, said carriage being laterally movable to bring said detents successively and individually into operative relation to said detent-disengaging rod and to bring said item wheels successively and

individually into operative relation to said movable stops and means to induce lateral movement of said carriage operatively connected to all said keys.

75. In an adding machine, totalizing mechanism comprising a series of totalizing wheels, a carrying train arranged between each of said totalizing wheels and the totalizing wheel of the next higher order and having a plurality of members, one member being operatively connected to the totalizing wheel of the lower order and arranged to be actuated thereby to positively move and set the carrying train in position to carry when actuated and to hold the same in position during the carrying actuation.

76. In an adding machine, item mechanism having an item lever, totalizing mechanism comprising a series of totalizing wheels, a carrying train arranged between each totalizing wheel and the adjacent totalizing wheel of the next higher order and having a plurality of members, one member being operatively connected to the totalizing wheel of the lower order and arranged to be actuated thereby to positively move and set the carrying train in position to carry when actuated and to hold same in position during the carrying operation, and means operatively connected to said item lever and arranged to be actuated thereby on its return stroke to actuate the carrying trains in succession.

77. In an adding machine, totalizing mechanism comprising a series of totalizing wheels, means for holding said totalizing wheels against rotation, a carrying train arranged between each totalizing wheel and the adjacent totalizing wheel of next higher order and comprising a releasing member having means to release the totalizing wheel of higher order from said holding means, and a set member operatively connected to the totalizing wheel of lower order and arranged to be actuated thereby to move and set said releasing member in position to release when actuated and to hold same in position during the releasing operation.

78. In an adding machine, item mechanism having an item lever, totalizing mechanism comprising a series of totalizing wheels, means for holding said totalizing wheels against rotation, a carrying train arranged between each wheel and the adjacent totalizing wheel of next higher order and comprising a releasing member having means to release the totalizing wheel of higher order from said holding means, and a set member operatively connected to the totalizing wheel of lower order and arranged to be actuated thereby to move and set said releasing member in position to release when actuated and to hold same in position during the releasing operation, and means operatively connected to said item lever to be actuated thereby on the return stroke of said lever to actuate the carrying trains in succession.

79. In an adding machine, totalizing mechanism comprising a series of totalizing wheels, means for holding same against rotation, a carrying train arranged between each totalizing wheel and the adjacent totalizing wheel of next higher order and comprising a releasing and carrying member for the purpose of releasing and carrying the totalizing wheel of higher order, and a set member operatively connected to the totalizing wheel of lower order and arranged to be actuated by it to move and set said releasing and carrying member in position to release and carry when actuated and to hold same in position during the releasing and carrying operation.

80. In an adding machine, item mechanism having an item lever, totalizing mechanism comprising a series of totalizing wheels, means for holding same against rotation, a carrying train arranged between each totalizing wheel and the adjacent totalizing wheel of next higher order and comprising a releasing and carrying member arranged to release and carry the totalizing wheel of higher order, a set member operatively connected to the totalizing wheel of lower order and arranged to be actuated by it to move and set said releasing and carrying member in position to release and carry when actuated and to hold same in position during the releasing and carrying operation, and means operatively connected to said item lever to be actuated thereby on its return stroke to actuate said carrying trains in succession.

81. In an adding machine, item mechanism having an

item lever, totalizing mechanism comprising a series of totalizing wheels, a carrying train arranged between each totalizing wheel and the adjacent totalizing wheel of next higher order and having a set lever operatively connected
 5 to the totalizing wheel of next lower order to set said carrying train in position to carry when actuated, a set lever lock pawl to lock said set lever, a carrying member to engage and carry wheel of next higher order, a supporting lever on which said carrying member is mounted, a
 10 sleeve, a series of cams mounted on said sleeve operatively connected to said supporting members and arranged to actuate them in succession and a second set of cams mounted on said sleeve and operatively connected to said set lever and set lever lock pawls to unlock, reset and re-
 15 lock said set levers and arranged to be functionally effective when said supporting members are in actuated position, and a spring arranged to be wound up on the initial stroke of said item lever and operatively connected to said sleeve to actuate same on return stroke of said item lever.
 20 82. In an adding machine, totalizing mechanism and item mechanism comprising an oscillating carriage containing an equal number of item members, springs and detents, said item members being capable of individual movement to be set to correspond to a number to be added,
 25 said springs being operatively connected to said item members and permanently tending to move same from normal position, said detents being arranged to hold said item members against movement, and means to oscillate said carriage to bring said item members into position
 30 to transfer movement from same to said totalizing mechanism.

83. In an adding machine, item mechanism comprising a plurality of item wheels capable of individual movement to be set to correspond to a number to be added and each having a detent to hold same against rotation, keys representing, respectively, the digits, means operatively connected to said keys to release said detents and to induce rotation and lateral movement of said item wheels, said item wheels being arranged to be released and rotated in succession and to be moved laterally in unison, an item
 35 lever, and means operatively connected to said item lever to engage and move to their normal position any item wheels that may have been set.

84. An adding machine comprising totalizing mechanism having a plurality of totalizing wheels and each having a detent arranged to hold same against rotation, item mechanism having a plurality of item wheels capable of individual movement to be set to correspond to a number to be added, means to set said item wheels and impart lateral movement to said item wheels to bring same into
 40 operative relation with said totalizing wheels, an item lever, and means operatively connected to same to bring any item wheels that may have been set into operative connection with an equal number of totalizing wheels and to release the holding detents of such totalizing wheels
 45 as are in operative relation with item wheels.

St. Louis, Mo., Nov. 11, 1905.

RICHARD VON REPERT.

Witnesses:

CHRISTIAN F. SCHNEIDER,
 KENT VON REPERT.