

No. 659,676.

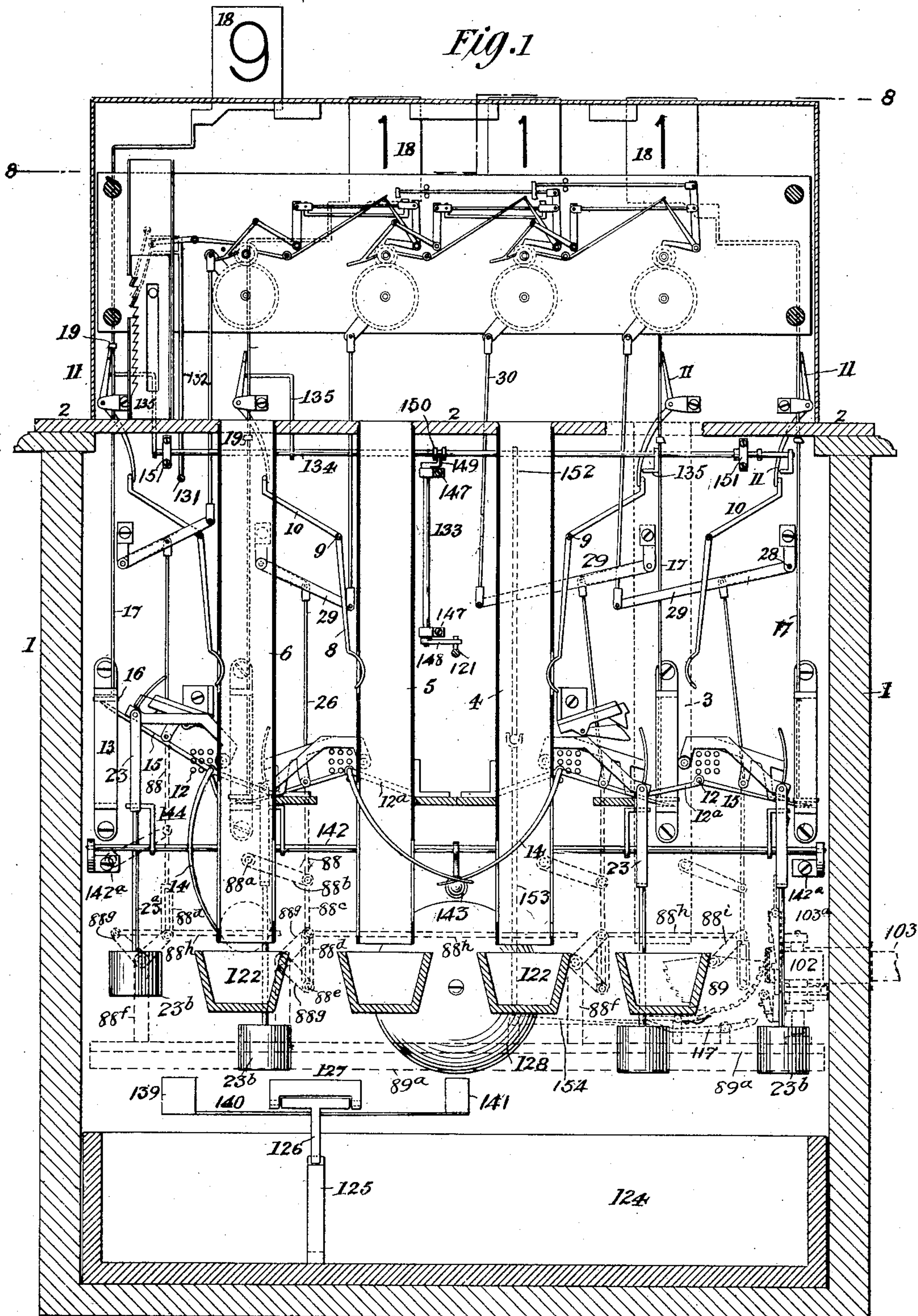
Patented Oct. 16, 1900.

P. KENNY.
CASH REGISTER.

(Application filed Oct. 25, 1897.)

(No Model.)

11 Sheets—Sheet 1.



Witnesses: *Raphael Vetter*
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No. 659,676.

Patented Oct. 16, 1900.

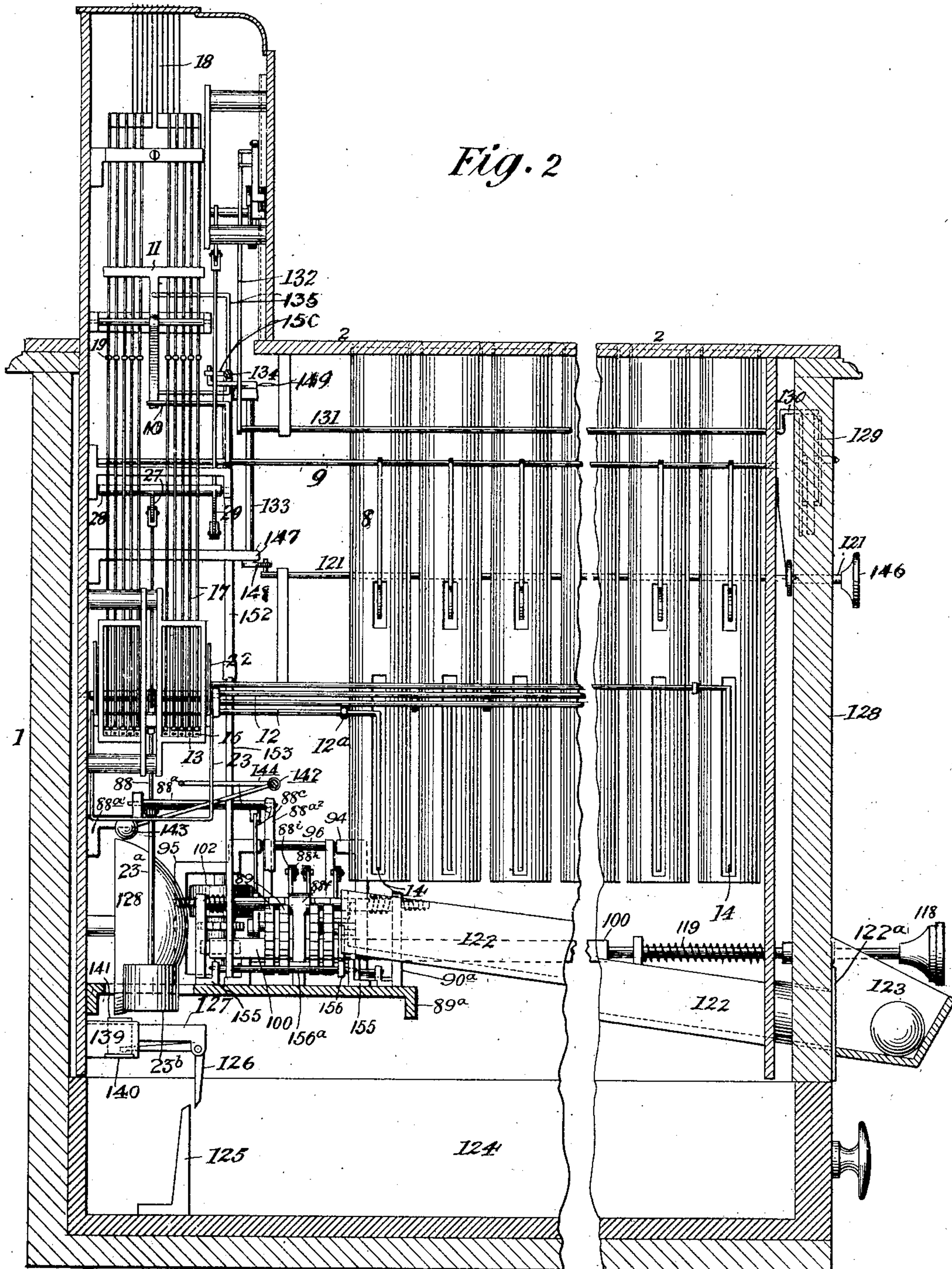
P. KENNY.
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(No Model.)

11 Sheets—Sheet 2.

Fig. 2



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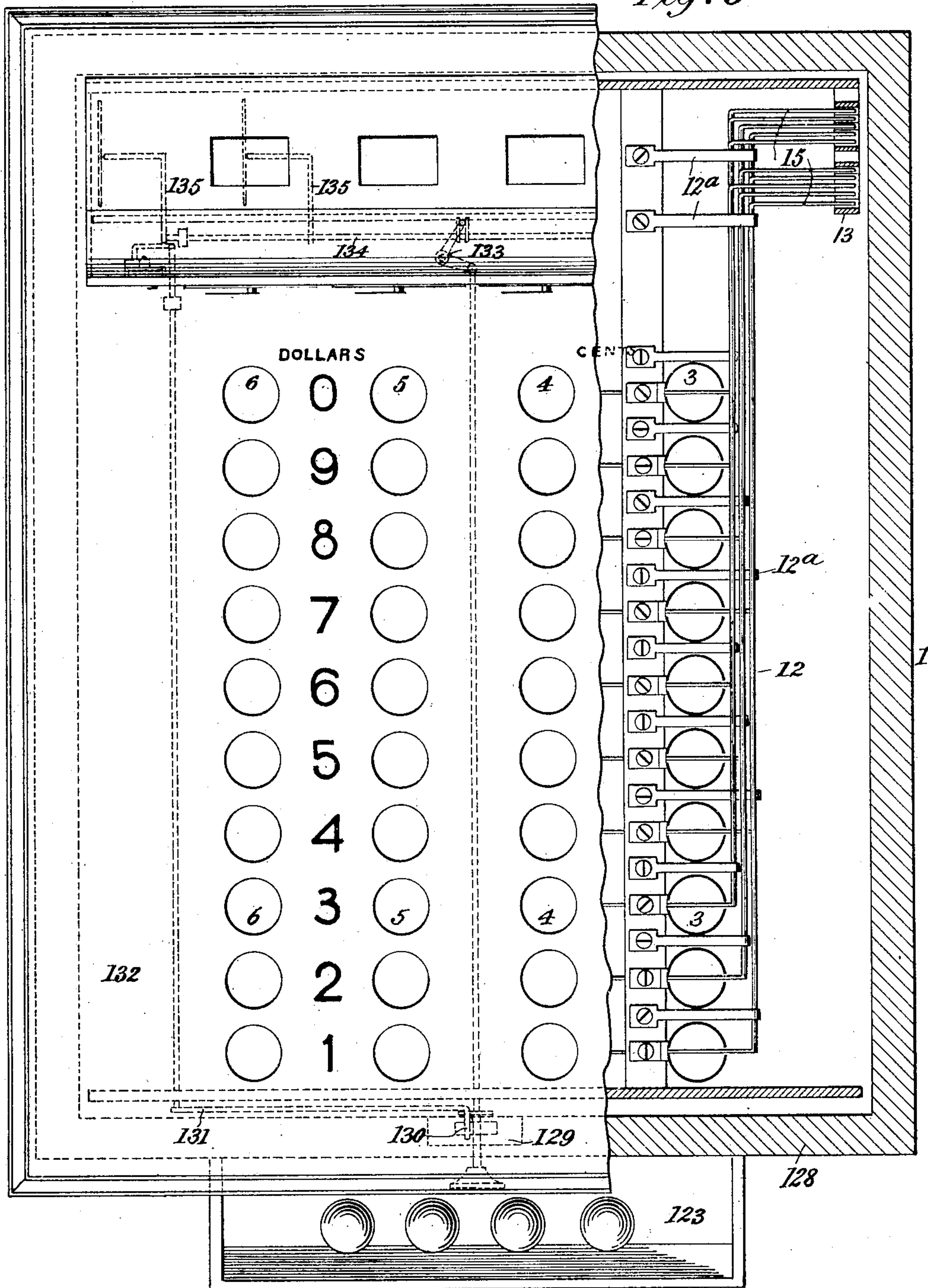
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(No Model.)

11 Sheets—Sheet 3.

Fig. 3



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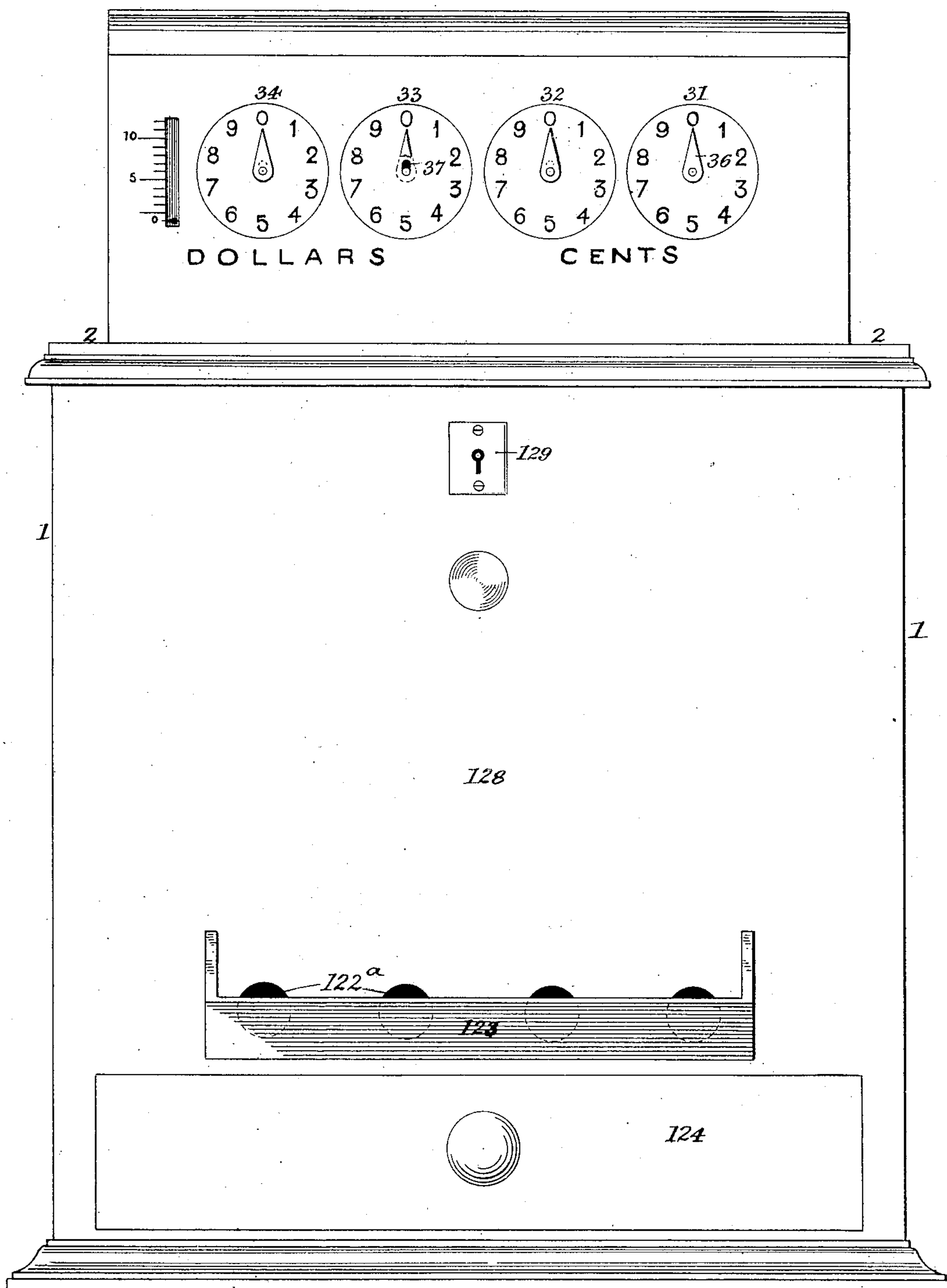
P. KENNY.
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(Application filed Oct. 25, 1897.)

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11 Sheets—Sheet 4.

Fig. 4



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CASH REGISTER.

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(No Model.)

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Fig. 5

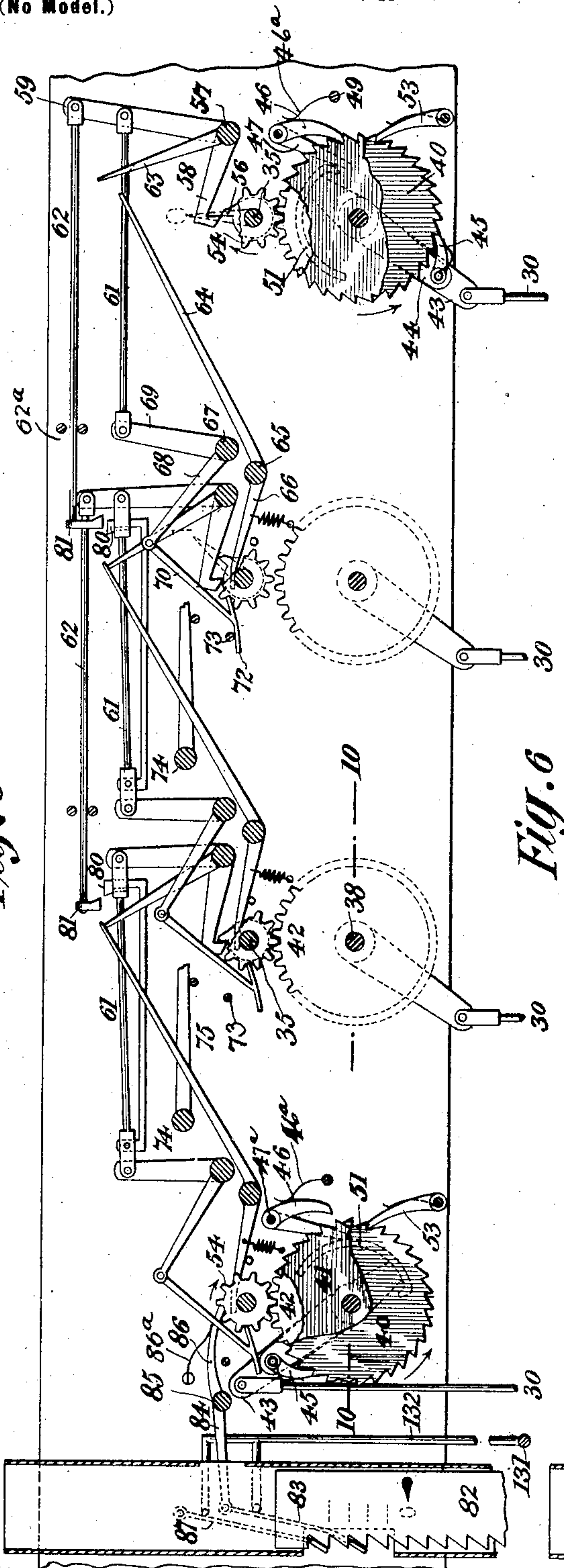
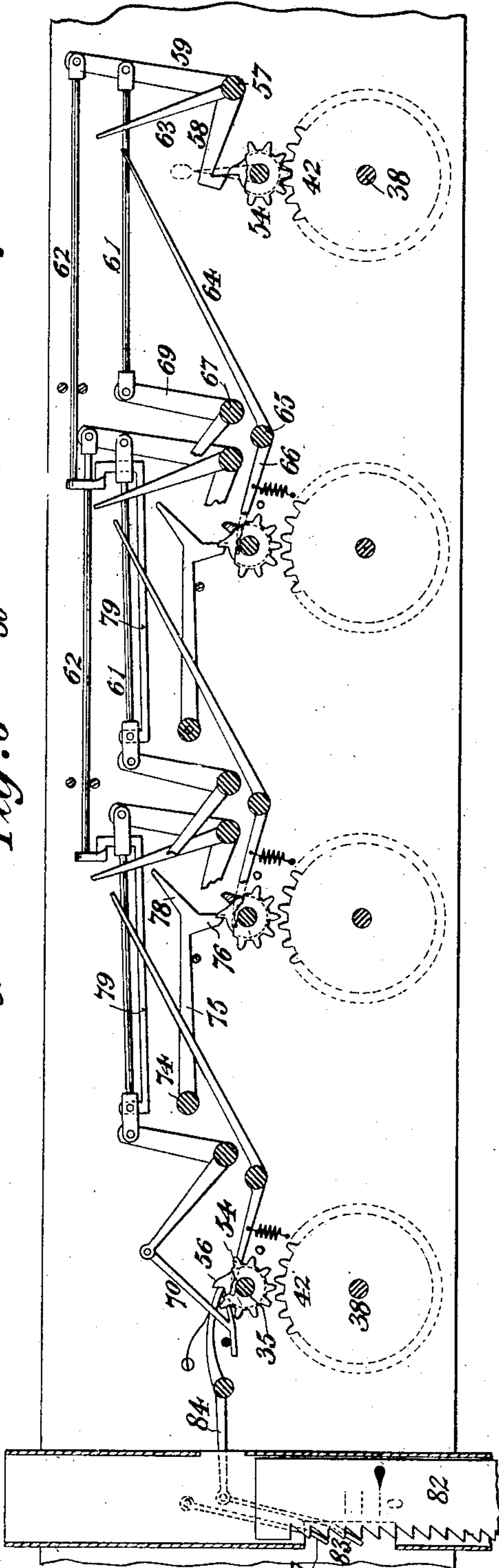


Fig. 6



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11 Sheets—Sheet 6.

Fig. 9

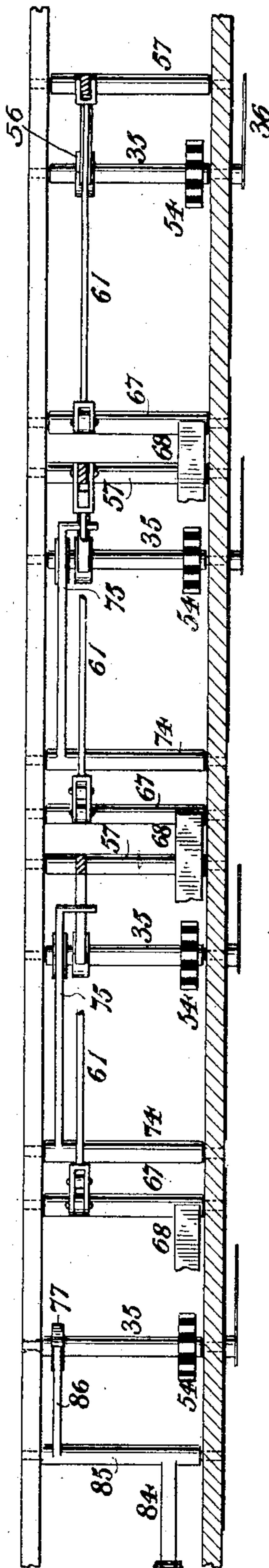


Fig. 10

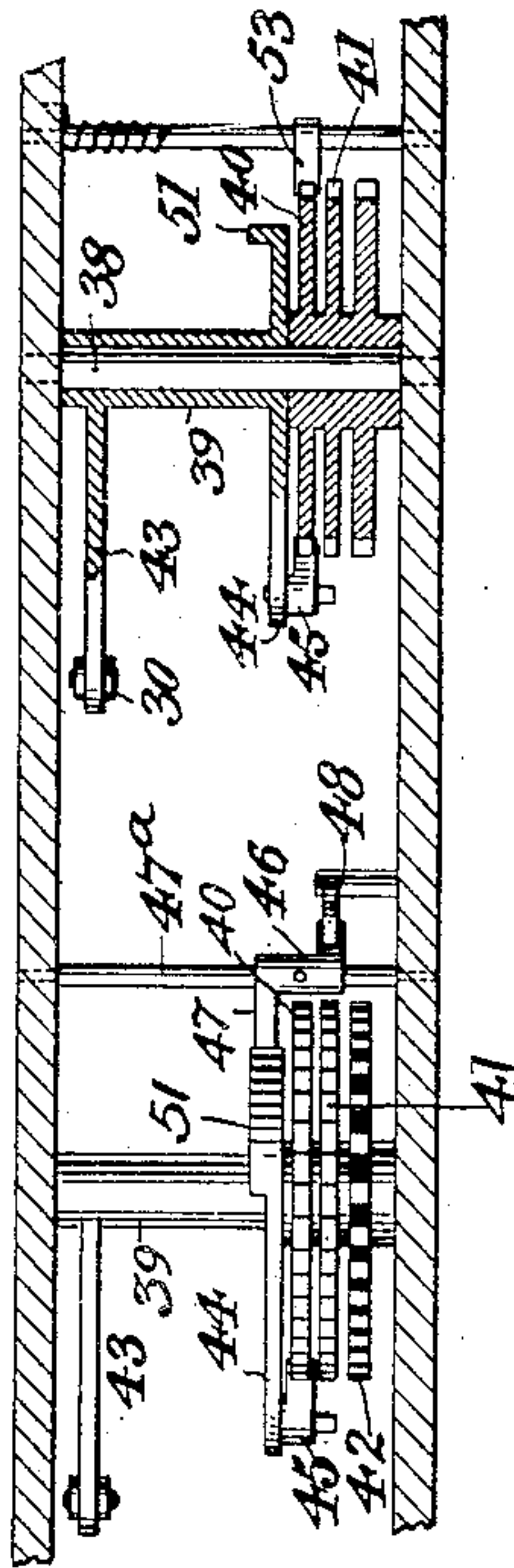


Fig. 11

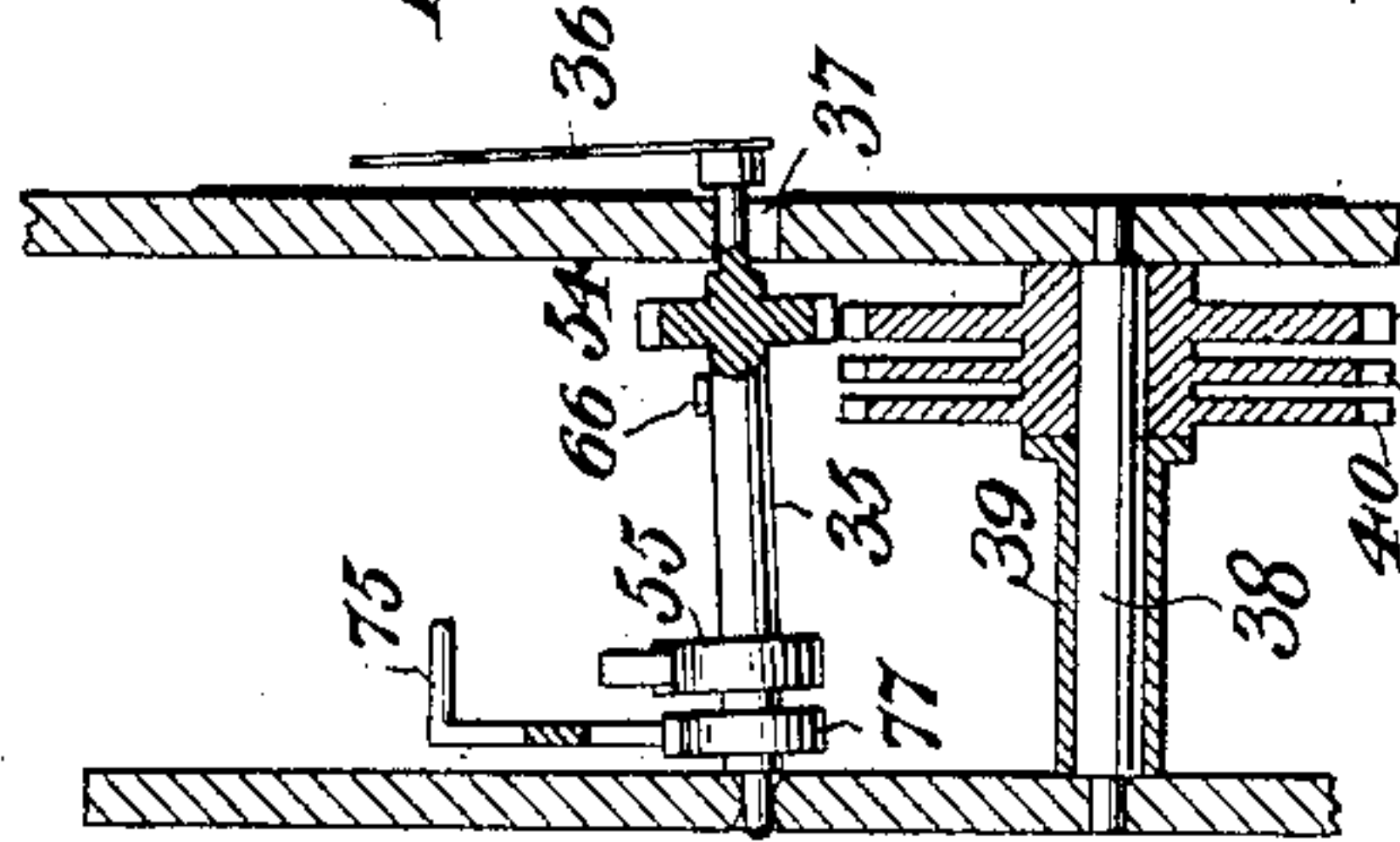
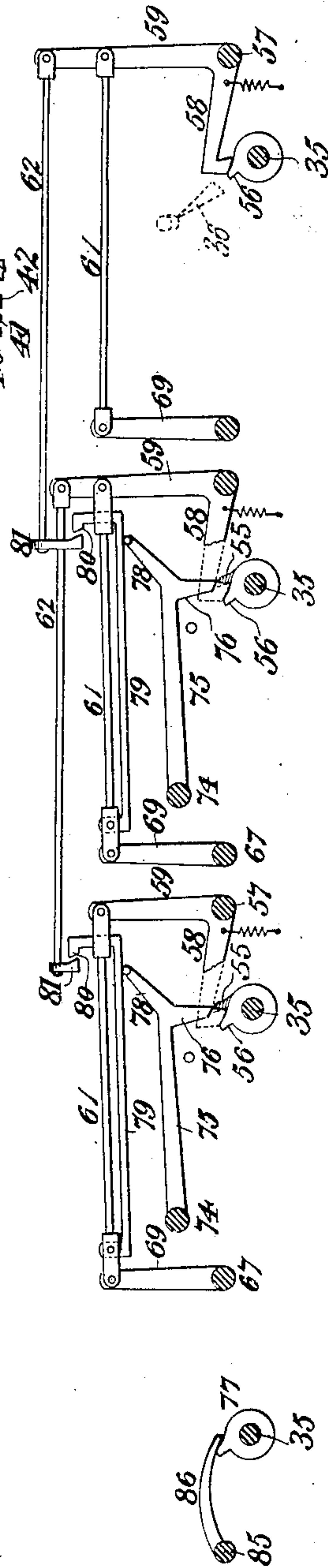


Fig. 7



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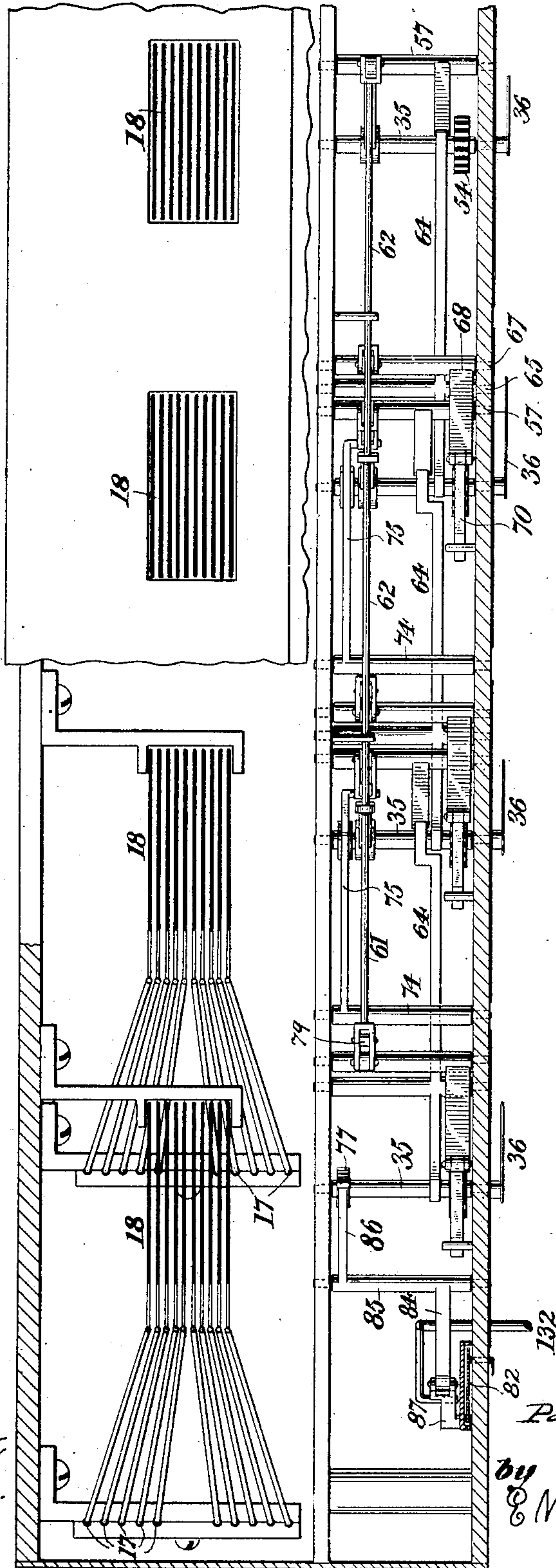
P. KENNY.
CASH REGISTER.

(Application filed Oct. 25, 1897.)

(No Model.)

11 Sheets—Sheet 7.

Fig. 8



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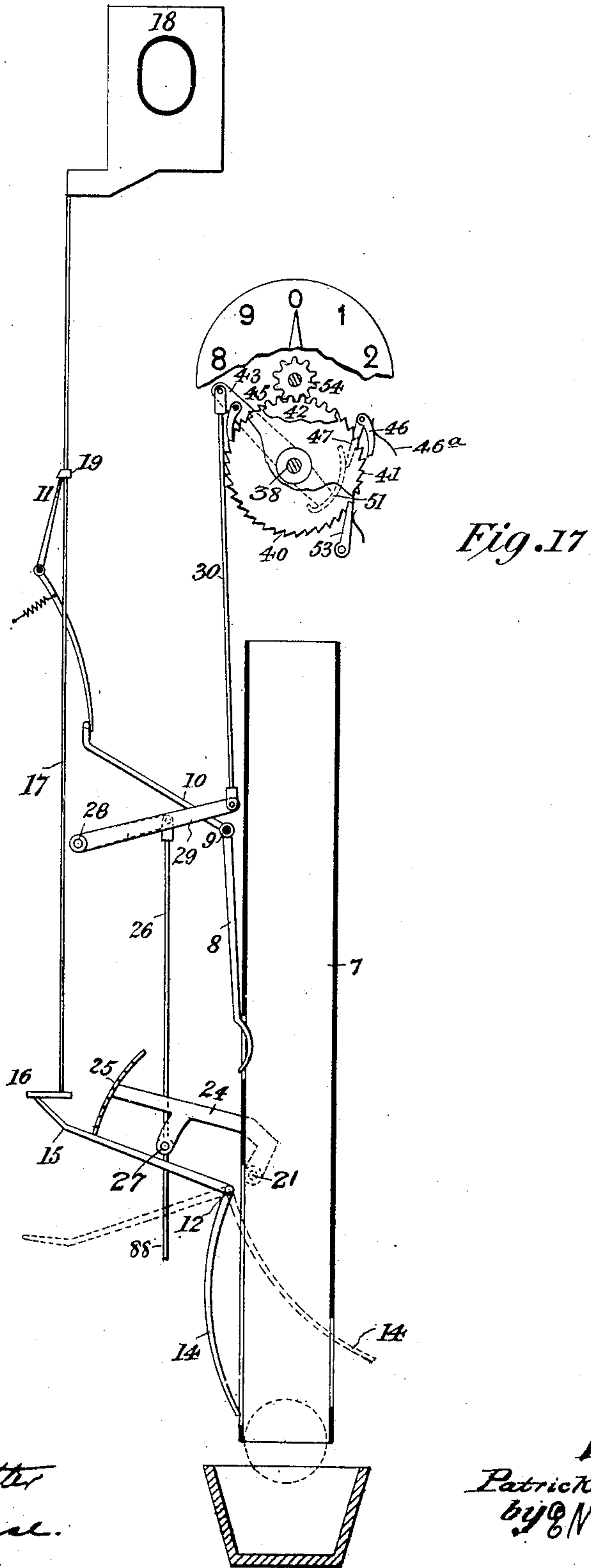
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P. KENNY.
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(Application filed Oct. 25, 1897.)

(No Model.)

11 Sheets—Sheet 9.



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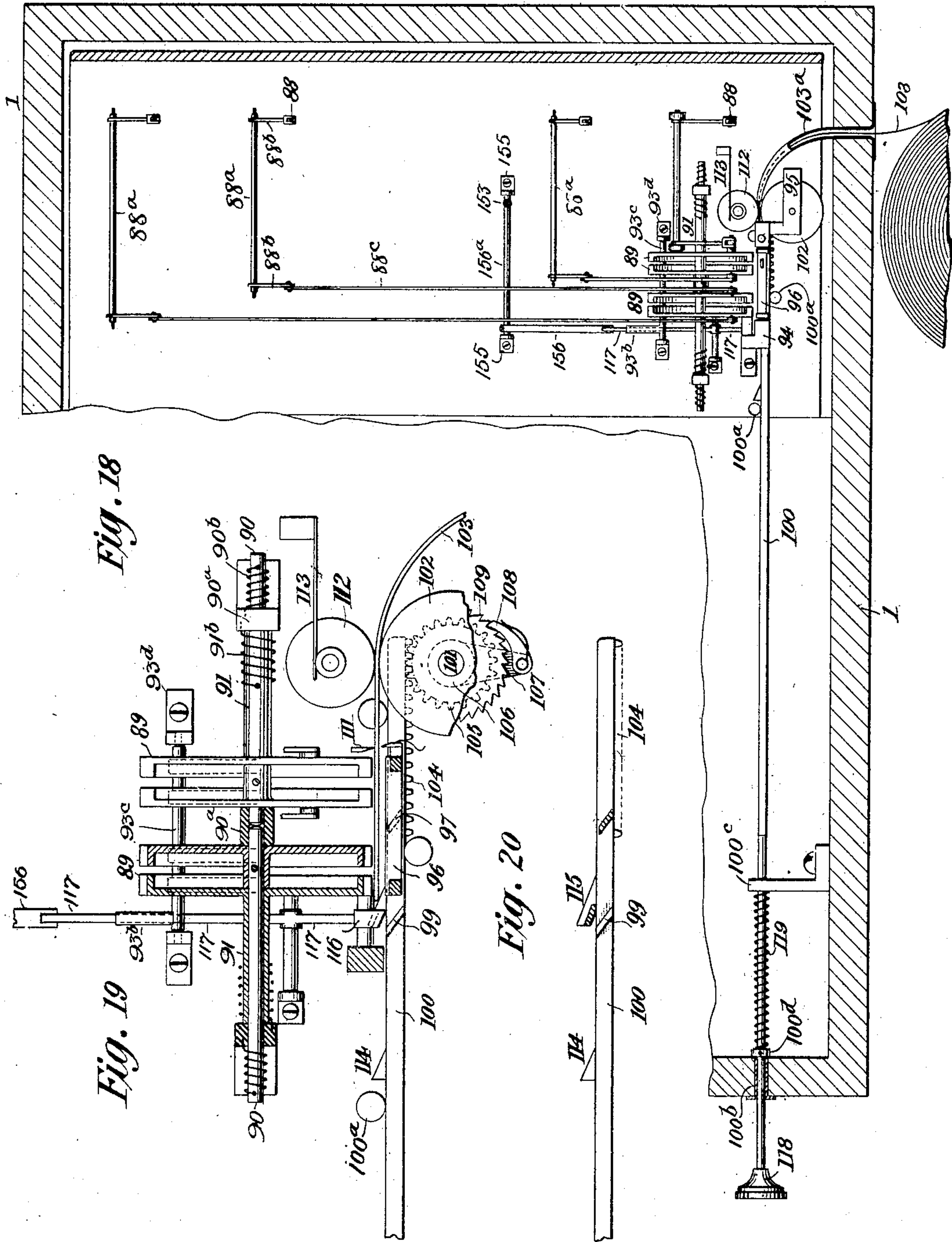
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(No Model.)

11 Sheets—Sheet 10.



Witnesses:
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(Application filed Oct. 25, 1897.)

(No Model.)

11 Sheets—Sheet 11.

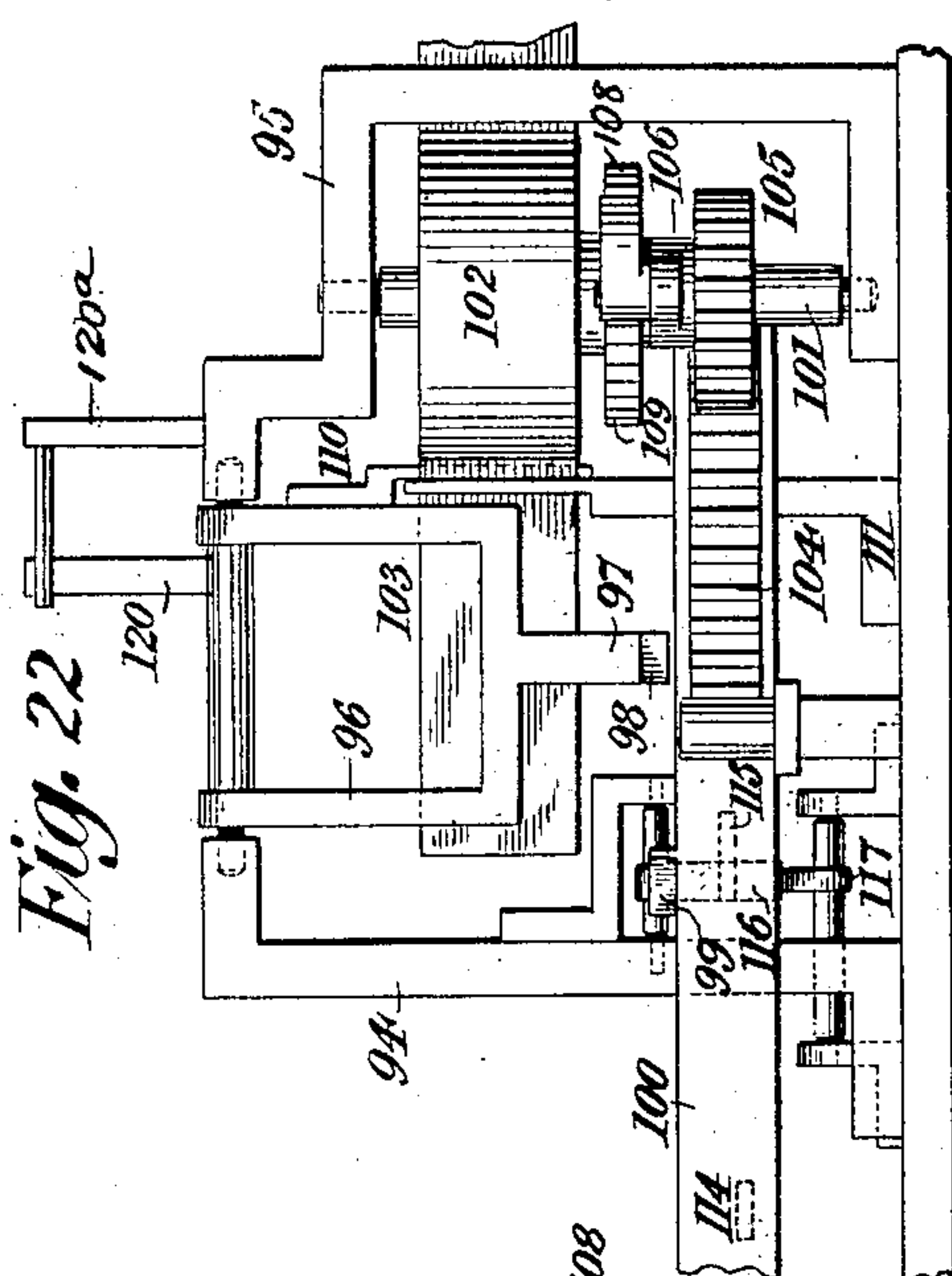
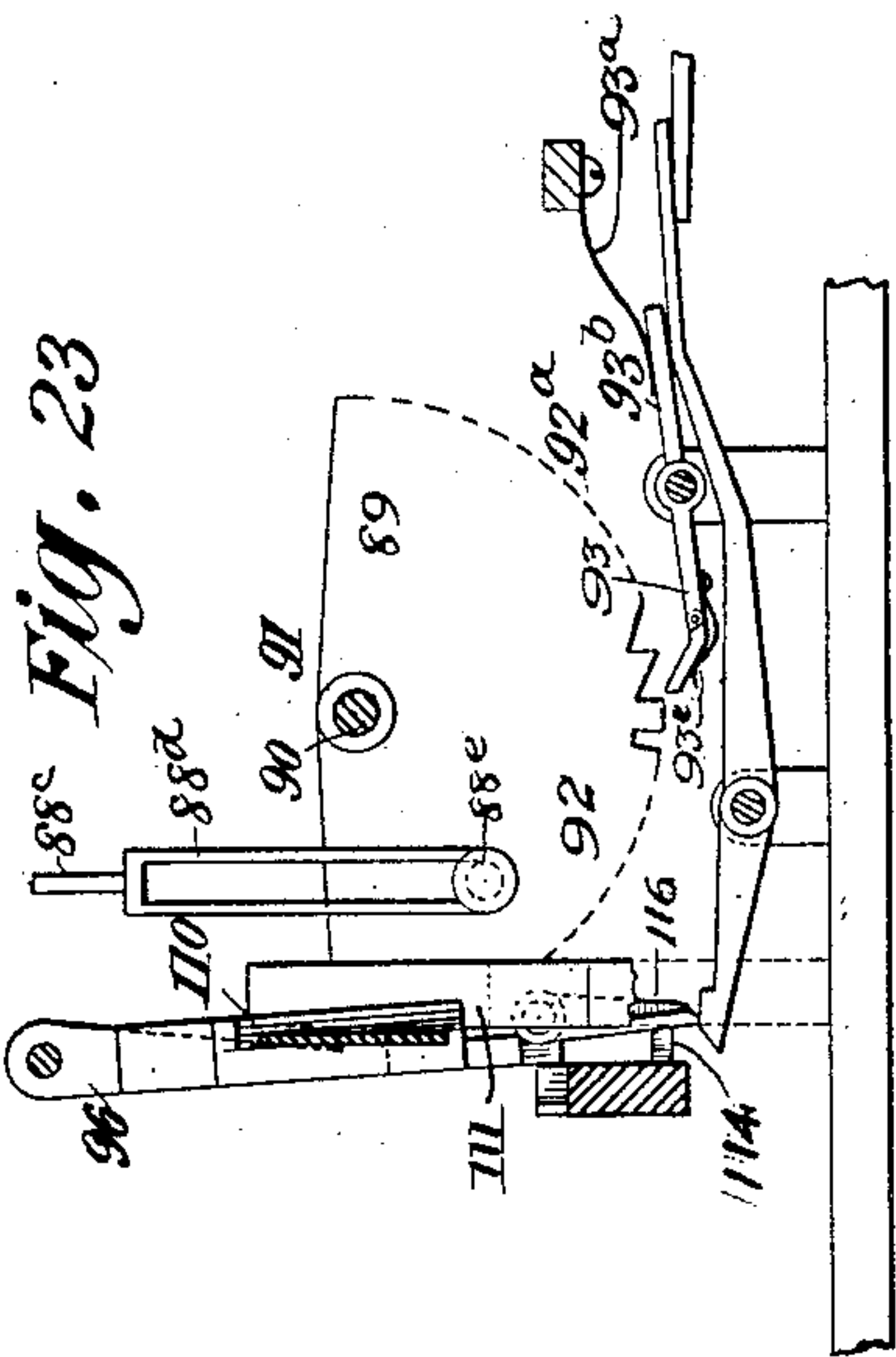
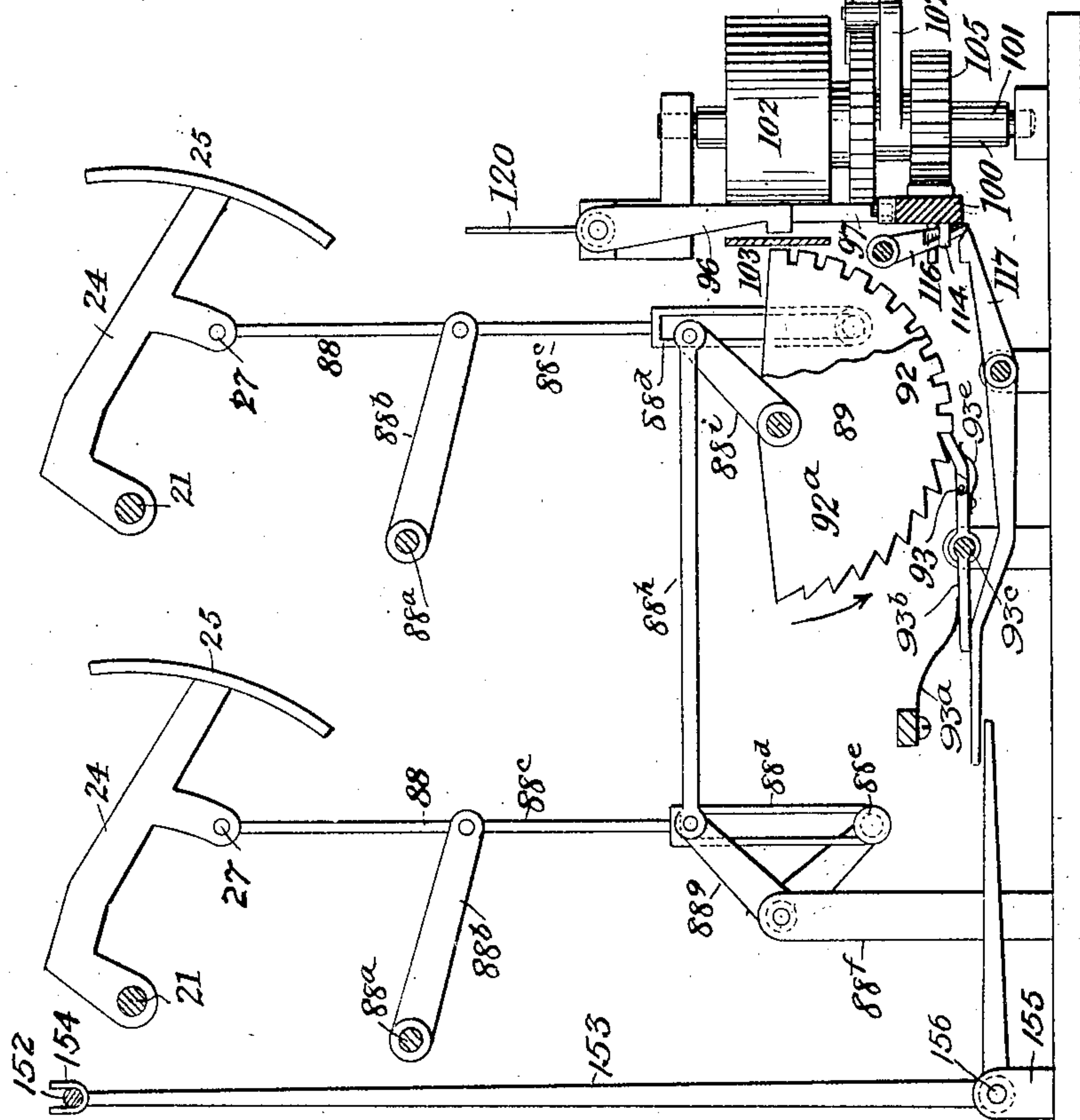


Fig. 21



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UNITED STATES PATENT OFFICE.

PATRICK KENNY, OF NEW YORK, N. Y., ASSIGNOR TO HIMSELF AND
EDWARD N. DICKERSON, OF SAME PLACE.

CASH-REGISTER.

SPECIFICATION forming part of Letters Patent No. 659,676, dated October 16, 1900.

Application filed October 25, 1897. Serial No. 656,273. (No model.)

To all whom it may concern:

Be it known that I, PATRICK KENNY, of the city, county, and State of New York, have invented a new and useful Improvement in
5 Cash-Registers, of which the following is a specification.

My invention relates to cash-registers, and especially to those registers provided with gravity-chutes as a means for operating them.

10 I shall first describe a register embodying my invention and then point out in the claims the novel features thereof.

Before entering upon a detailed description of this register I shall give a general description of its parts and the functions thereof.
15

The gravity-chutes provided in this machine, together with gravity-pieces adapted to pass through the chutes, constitute the operating mechanism for my register. These
20 gravity-pieces may be spheres of some heavy material, and when they are placed in the upper end of the chutes, which are preferably vertical, gravity causes them to drop through the chutes, and the force thus acquired by
25 their fall constitutes the actuating force for the register. A system of mechanical transmitting devices serves to convey the force to the several parts of the register.

The gravity-chutes I have segregated into
30 series, and preferably employ four series having ten chutes in each. In such an arrangement each series would represent one place of figures in an amount to be registered and each chute of the series would stand for one
35 of the ten numerals from "0" to "9," which might occupy that place of figures. Thus a sale of any amount not more than ninety-nine dollars and ninety-nine cents might be registered at one operation. A different number
40 of series or of chutes might be employed in a register, thus depending upon the requirements of each case. All the chutes have an opening or entrance in the top plate of the register, where the gravity-piece may be conveniently inserted to operate the register, and
45 the chutes are numbered to facilitate the insertion into the right chute. After a registration the gravity-pieces return to some place from which they may be obtained for
50 the next operation.

I have provided in connection with the op-

erating mechanism above described a series of display-disks for displaying the amount of each purchase. The display-disks are numbered to correspond to the chutes, and each
55 disk is operated by the passage of a gravity-piece through the corresponding chute of the corresponding series through a device which I shall term the "display" mechanism.

For registering the total amount of the cash
60 taken in or of the purchases made I have provided dials having indices, one dial being provided for each series of chutes. Each dial is operated by its corresponding series of chutes through mechanical devices, which I shall
65 term the "dial" mechanism.

It is necessary in order to obtain a correct total of the amounts registered that on the complete revolution of one of the indices and as it passes from the "9" division to the "0"
70 of its dial the index of the next higher dial should be advanced one division. This result I accomplish through what I shall term the "transfer" mechanism, which acts in conjunction with the dial mechanism.
75

A slip-printing mechanism may conveniently be employed in a register, and I have illustrated such a device in the present machine. The function of the mechanism is to impress upon a strip of paper or other suitable
80 substance the amount of the purchase, as indicated upon the display-disks, and any other data desirable and to sever the portion of the strip containing such impression. This I accomplish through rotating type-disks,
85 which are set to the desired figure through the action of the gravity-piece in the chute. While thus set the printing is accomplished through a separate device operated by hand, and this operation also serves to cut off the
90 slip and to feed forward the strip for a new operation.

A cash-drawer may conveniently be employed in a register, as also a gong, having means for ringing it when the drawer is
95 opened or when a purchase is registered.

In the drawings, Figure 1 is a vertical section upon a plane parallel to the front of a register embodying my invention, the printing mechanism being indicated in dotted
100 lines. Fig. 2 is a section taken between the series of chutes 5 and 6 of Fig. 1, at right an-

gles to that view, in which part of the register is removed to condense the drawing. Fig. 3 is a plan view, partly in section. Fig. 4 is a front elevation showing the registering-dials. Fig. 5 is an elevation of the transfer mechanism, showing also parts of the dial mechanism. Figs. 6 and 7 are elevations of the transfer mechanism. Fig. 8 is a top view, partly in section, of the transfer and display mechanism, taken upon the broken line 8 8, Fig. 1. Fig. 9 is a plan view of the transfer mechanism with certain parts removed. Fig. 10 is a section taken upon the line 10 10 of Fig. 5. Fig. 11 is a detail sectional view of the parts in Fig. 10. Figs. 12 and 13 are side elevations of certain parts of the dial mechanism and of the display mechanism, showing the same in different positions. Fig. 14 is a front elevation of the same parts of the dial mechanism that are shown in Fig. 12. Fig. 15 is a top view of the same mechanism that is illustrated in Fig. 14. Fig. 16 is a detail section taken upon the line *a a* of Fig. 12. Fig. 17 shows in elevation the display mechanism appurtenant to a single chute and parts of the dial mechanism appurtenant to one of the series of chutes, the rod 88 for connecting with the printing mechanism being broken off near the arm 24. Fig. 18 is a plan of the slip-printing mechanism. Figs. 19 and 20 are enlarged views of certain parts of the mechanism that is illustrated in Fig. 18. Fig. 21 is a front elevation of the printing mechanism, showing its connection with the operating mechanism. Fig. 22 is a side elevation of the same with certain parts removed. Fig. 23 is a detail rear view of certain parts shown in Fig. 21, also in elevation.

In the several drawings similar numerals of reference are employed to designate corresponding parts.

Referring to Figs. 1, 2, 3, and 4, the numeral 1 represents the case of a cash-register embodying my invention. It is provided with an operating-plate 2, in which are the openings of the gravity-chutes. These chutes and openings are segregated into the four series indicated by the numerals 3, 4, 5, and 6, representing the figures of the units, tens, hundreds, and thousands place, respectively. Ten chutes are provided in each series, and each of these is marked with one of the ten numbers from "0" to "9," as shown in Fig. 3. Depending from each of these openings is a gravity-chute 7, Fig. 17, through which a gravity-piece may be passed.

18 represents a display-disk. Each of the display-disks is numbered to correspond to one of the chutes, and the ten disks operated through each of the series of chutes are grouped together, as shown in Figs. 2 and 8.

17 represents a display-rod, to which is attached one of the display-disks. This rod is suitably supported in bearings, which permit a free vertical motion, and it is provided with a catch 19, Fig. 17, for supporting it and the display-disk 18 when in an elevated position.

11 represents a spring-actuated rocking arm which engages the catch 19 when the display-disk is in display position and is adapted to release the catch and the display-rod 17 and let them drop when an arm 10 upon a rod 9 is pressed against the rocking arm 11. The rod 9 (see also Fig. 2) passes from the front to the rear of the register alongside of one of the series of chutes and is provided with suitable bearings which allow its rotation. Also attached to the rod 9 are arms 8, one of these being provided for each of the chutes and projecting slightly therein, whereby the fall of a gravity-piece in any chute of that series causes the releasing of the display-rods 17 through the intermediate arms.

In order to raise the proper display rod and disk, there is provided for each chute of the series a rod 12, Figs. 17 and 2, suitably journaled at 12^a, which carries an arm 14, preferably curved, which normally projects into the chute through suitable slots in the side thereof. 15 represents a second arm attached to the rod 12 near its rear end, upon which a foot-plate 16, attached to the display-rod 17, is adapted to rest.

13 represents a guide-frame, (see also Fig. 1,) within the guides of which are confined the foot-plates 16 and the arm 15 appurtenant to each display-disk.

The operation of the display mechanism described is as follows: The gravity-piece in its fall first encounters the end of the arm 8, which projects into the chute and, forcing it out, causes the rotation of the rod 9 and the arm 10 upon it. The rocking arm 11 being pressed by the arm 10 releases all the catches 19 of the display-rods 17 and allows any display-disks which may have been raised by a former operation to drop again to an unseen position. The spring attached to the arm 11 returns these parts after the passage of the gravity-piece. The arm 14, as shown in its dotted position, Fig. 17, is next encountered by the gravity-piece and is revolved to the position shown in full lines by being forced out of the chute. This causes the rotation of the rod 12 and the elevation of the arm 15 at the other end thereof, and consequently the elevation both of the display-disk corresponding to the chute and the display-rod 17, whose foot-plate 16 rests upon the rod 15. The catch 19 is elevated to a point above the arm 11, upon which it rests and supports the display-rod when the other parts return to their normal position.

The dials upon which the sums are to be registered are shown in Fig. 4, and the dial mechanism is illustrated in Figs. 12 to 17. Referring to Figs. 17 and 15, 24 represents a limit-arm attached to a shaft 21, which is journaled at one end in the register-case and at its other end in a supporting-bracket 20, attached to the case. This limit-arm 24 is provided at its outer end with a stepped cross-piece 25, the steps of which are situated directly above the arms 15, which move in the

guide-frame 13 and with which steps the arms 15 are adapted to engage when elevated, and thereby elevate the limit-arm 24.

The motion imparted to the limit-arm by the arm 15 varies according to the height of the step of the cross-piece 25 engaged, because (see Fig. 14) the arm 15 must rise through the intervening distance before engaging the step and the remaining portion only of the rise elevates the limit-arm. By a suitable arrangement of the steps the rise of the limit-arm is made exactly proportional to the number of the chute through which the actuating gravity-piece is passed. No step is provided for the arm 15 corresponding to the "0" chute, and so there is no rise caused by that arm, while the next arm, that corresponding to the "9" chute, engages the step immediately and raises the limit-arm the full distance. This proportional movement is communicated to the dial through a rod 26, Fig. 17, which is pivoted to the limit-arm 24 at 27.

29 represents an intermediate lever (shown also in Fig. 1) pivoted to the register-case at 28 and to which the rod 26 is pivoted. At the extremity of the lever 29 is pivoted a second rod 30, the other end of which is pivoted to a registering-arm 43, and this registering-arm transmits the proportional movement through a pawl 45 to a ratchet-wheel 40.

To prevent the limit-arm 24 from being carried by its momentum beyond the point to which the arm 15 has elevated it, there is provided a series of stops 32, Figs. 12 to 16, adapted to engage the upper sides of the steps of the cross-piece 25. These stops are adapted to slide in slideways in a support 31 attached to the register-case, and each of them is provided at its outer end with a curved portion 33, against which the arm 15 in its ascent forces a cam 34. The cam 34 is pivoted beneath the sliding stop 32 and is adapted to force out the sliding stop, as shown in Fig. 13, to meet the proper step of the cross-piece 25 of the ascending limit-arm 24, and in this way prevent the momentum of the parts from giving to the registering-arm 43 a movement greater than desirable. A spring 35 serves to return the sliding stop 32 and the cam 34 to their normal position. The proportions of the lever 29 are such that on elevating the limit-arm a distance proportional to the number to be recorded the movement transmitted to the registering-arm 43 will be such that the pawl 45, actuated by means of the registering-arm, will be carried around the ratchet 40 a number of teeth proportional and preferably equal to the number to be registered, which is the number of the chute actuating the limit-arm. When the pawl has thus been advanced the proper number of teeth, it is necessary that the registering-arm 43 be returned to its lowest position, and as this return movement is required to rotate the ratchet 40 and the other parts in connection with it a force greater than the weight

of these parts may be necessitated. 22 represents a frame for this purpose. It is shown pivoted to the axle 21, which carries the limit-arm 24, and the outer end of the frame 22 rests upon a continuation 24^a of the limit-arm 24, as shown in Figs. 12 and 15. 23 represents a swinging frame, which is pivoted to the frame 22 near the end thereof and carries a weight 23^b at the end of a rod 23^a, attached thereto. (See Fig. 1.) On elevating any of the arms 15 the frame 22 (see Fig. 14) is immediately engaged and is elevated with the arm 15 the entire distance. When the gravity-piece is passed and the arm 15 is released, the frame 22 drops upon the projection 24^a of the limit-arm 24 and by its momentum pulls down the registering-arm 43 through the intermediate lever and rods, and thus actuates the ratchet 40.

Referring to Figs. 10 and 17, the ratchet 40 is shown attached to an axle 38, journaled in the framework of the mechanism, and this axle also carries a reversed ratchet 41 and a gear-wheel 42, all of which for convenience may have the same number of teeth.

39 represents a sleeve loose upon the axle 38, which sleeve carries the registering-arm 43 and also a second arm 44, upon which is pivoted the pawl 45 above referred to.

54 represents a pinion upon whose axle 35 is attached an index 36, Fig. 11, and which pinion ordinarily is in mesh with the gear-wheel 42. By employing ten divisions upon the dial and ten teeth upon this pinion it is evident that the index will be advanced one division of the dial for each tooth of the ratchet 40 slipped over by the pawl 45 in the ascent of the registering-arm 43, and will thus register upon the dial an amount equal to the number of the chute through which the actuating gravity-piece is passed.

53 represents a check-pawl upon the ratchet 40 to prevent movement in the wrong direction of the gear-wheel 42.

46 represents a locking-pawl attached to an axle 47^a, whose purpose is to prevent an over movement of these parts from their momentum. This pawl is adapted to engage with the reversed ratchet 41 when the registering-arm 43 is in its normal or lowest position. When, however, an amount is registered and the registering-arm is raised for that purpose, a cam 51 upon the tailpiece of the arm 44, Figs. 10 and 17, engages an arm 47, attached to the axle 47^a, which carries the locking-pawl 46, and throws the pawl 46 out of engagement with the ratchet 41. The reversed ratchet 41 and the gear-wheel upon the same shaft are thus free to rotate when the pawl 45, during the return movement of the registering-arm, engages the ratchet 40 and carries it around with it. As soon, however, as the parts are in their normal position the cam 51 releases the pawl 46 and the spring 46^a presses the pawl 46 against the reversed ratchet 41, and thus brings the parts to rest.

The operation of the parts constituting the

dial mechanism is as follows: A gravity-piece being passed through any chute of one of the series of chutes it meets the curved arm 14, forcing it out through the slot in the side of the chute. This arm causes the rod 12 to rotate and to elevate the arm 15 at its rear end through a certain uniform distance. The arm 15 in its rise first engages the weighted frame 22, which it elevates the full distance. After rising a certain distance the arm 15 engages the proper step of the cross-piece 25 on the limit-arm 24 and thereafter elevates the limit-arm the remaining distance, which is proportional to the number of the chute. Before completing the rise the arm 15 engages the cam 34 and elevating it forces out the sliding stop 32, which engages with the upper step of the cross-piece 25 and prevents the limit-arm from rising above that point. At this stage the gravity-piece drops out of the chute, its descent being continuous and rapid. The arm 14 is thus released, and with its release there drops back the arm 15, the cam 34, the weighted frame 22, and the limit-arm 24. The frame 22 strikes the projection 24^a of the limit-arm 24, and the momentum of its impact insures the complete return of the limit-arm and of the registering-arm 43, to which the limit-arm is connected. The limit-arm 24 thus causes the registering-arm 43, through the connecting-rods, to rise and fall a distance proportional to the number of the chute. The registering-arm through the sleeve 39 transmits the movement to the pawl 45 upon the arm 44, and the pawl slips around the ratchet 40 during the rise and carries the ratchet around during its return movement, and this rotation of the ratchet will also be proportional to the number of the chute. The ratchet 40 actuates the gear-wheel 42 through their common axle, and the latter, in mesh with the pinion 54, rotates the pinion and the index 36 connected to it. The index is thus made to indicate or register upon the dial the number of the chute. The locking and check pawls prevent improper movements and secure accuracy.

The mechanism described thus far would suffice to register but one number; but as the dials are intended to indicate the sum of all the amounts registered it is evident that there must be a means of registering on each dial the amount to be carried forward from the next lower dial—that is, when one index has traveled around past the “9” mark to the “0” it is necessary that the index of the next higher dial should be advanced one division. The transfer mechanism which acts in conjunction with the dial mechanism accomplishes this result by taking the index-pinion 54 out of mesh with the gear-wheel 42, advancing it one tooth and replacing it in mesh whenever the index of the lower dial passes from the “9” to the “0” division.

The transfer mechanism is shown in the drawings in Figs. 5 to 11. All the shafts 35, which carry the indices 36 and the pinions

54, play in slotted bearings at their pinion end, as shown in Fig. 11, excepting that carrying the index of the first or unit dial, and all of these shafts, excepting the last, which carries the thousands-index, have a cam 56, Fig. 7, which cam is adapted to engage a rock-arm 58, attached to a shaft 57, pivoted in the frame, and to elevate the arm 58 when the index upon the shaft 35 passes from “9” to “0” upon the dial. A second arm 59 upon the shaft 57 and a connecting-rod 61 serve to transmit this motion to a shaft 67, also pivoted in the frame, Fig. 7, through an arm 69, attached to the shaft 67. Referring to Fig. 5, 68 represents a second arm upon the shaft 67. To this is hung a rod 70, having at its loose end a claw 72, adapted to engage the teeth of the pinion 54. Looking at the third or hundreds pinion in Fig. 5 it is seen that this claw is inclined, and it rests lightly upon the pinion, which may therefore rotate freely with the gear-wheel 42. When, however, the next lower index passes from “9” to “0” and elevates the arm 58, the arm 68 is also elevated through the aforesaid connecting-rods, and the rod 70, with its claw 72, is drawn up. The claw then engages a tooth of the pinion 54, lifts the pinion out of mesh, causes it to rotate the space of one tooth, a pin 73 limiting this rotation, and then after the cam 56 has released the arm 68 drops back and puts the pinion 54 again in mesh with the gear-wheel. In this way each index is advanced one division for each complete revolution of the next lower index. 66 represents a spring-actuated guard-arm upon a shaft 65, and it serves to return the pinion 54 into mesh with the gear-wheel 42 when released by the claw 72, Figs. 5 and 6. 64 represents a second arm upon the shaft 65. It rests normally upon an arm 63, which is secured to the shaft 57, and thus serves to lock the guard-arm 66 when the cam 56 is not in contact with the rock-arm 58. When, however, the rock-arm 58 is elevated by the cam, the arm 63 is revolved with the shaft 57, and it then releases the arm 64, and so permits the unmeshing and rotating of the pinion 54. A general outline of the operation of these parts of the transfer mechanism is as follows: When the registering-arm 43, Fig. 5, is lowered after being elevated the required number of teeth, it rotates, by means of the pawl 45, the ratchet 40 and the gear-wheel 42. Supposing this additional amount is sufficient to carry the index past the “9” mark of any dial, the cam 56 will then come into contact with the rock-arm 58 and in elevating it rotate the shaft 57 with its other arms. The arm 63 releases the guard-arm 66, and the arm 59 through the mechanism described lifts the claw 72 of the arm 70, which removes the pinion 54, rotates it one tooth, and replaces it.

If several of the dials should indicate the figure “9” at the same time, it is evident that the drop of one gravity-piece may be required

to rotate two or more of the indices simultaneously. In order to lessen the friction of moving so many parts and to prevent inaccuracy due to the straining of the various arms, a series of supplementary connecting-rods 62 are provided, which serve to make direct connection between non-adjacent systems, and so relieve the cams 56 of the additional strain imposed by the necessity of moving the two systems. These connecting-rods 62 are pivoted to the arm 59 at one end, Figs. 5 and 6, and slide between guide-pins 62^a.

Referring to Figs. 7 and 8, 79 represents a latch pivoted at one end to the connecting-rods 61 of the intermediate systems and having a claw 80 at the other end, which passes up through a slot in the connecting-rod 61. This claw is adapted when in an elevated position to engage with a similar claw 81, projecting downward from the supplementary connecting-rod 62. The latch 79 is adapted to be elevated through a lever 75 upon a shaft 74, journaled in the frame. The lever 75 has a projection 78 for lifting the latch and a projection 76, which is elevated by a cam 55 upon the shaft 35 of the intermediate systems and is held in the elevated position as long as the dial indicates the figure "9." It is evident that if when in this position an amount is added to the lower dial, which will carry the index beyond the "9" mark, the claws 80 and 81 will engage and that the revolution of the arm 59 of the lower system will not only cause the arm 69 of that system to revolve, but through the rod 62 of that system and 61 of the higher system it will cause the rotation of the arm 69 of the higher system, and as it is through these arms 69 and the claw-rods 70 that the pinions 54 are advanced it is evident that the indices of both the higher dials will be advanced one division, thus accomplishing the required transfer. This action would take place throughout the whole transfer mechanism if all the dials should indicate "9" when a gravity-piece was dropped into one of the first or units series of chutes, and if none of the dials should indicate "9" the rods 62 would play idly back and forth.

77 represents a cam upon the shaft 35 of the last or thousands system.

85 represents a shaft pivoted in the frame, which carries an arm 86, and this arm rests upon the cam 77, so as to be raised and lowered as the shaft rotates, Fig. 9. Fig. 5 shows the shaft 85, which has attached to it a second arm 84, opposite to the arm 86. The arm 84 carries a suspended rod 83, having a hooked end adapted to engage in notches in the edge of a sliding plate 82. When the cam 77 raises the arm 86, the suspended hook drops to the next notch of the plate 82, and when the cam passes a spring 86^a, pressing upon the arm 86, raises the rod 83 and with it the plate 82, to which is attached an index. On the front of the register there is provided a scale, (shown in Fig. 4,) over which the in-

dex travels and which is graduated to correspond with the notches for indicating the number of revolutions of the thousands-dial. A second hooked rod 87 serves to retain the plate and index in the elevated position.

132 represents a rod for releasing the plate 82 by throwing the suspended hooks 83 and 87 out of sustaining position, the two arms of the rod pushing the hooks away from the plate when the rod 132 is revolved about its supporting-shaft 131. This shaft 131 (shown in Fig. 2) extends to the front of the machine, and it has suitable bearings at either end. The front end of this shaft is formed into a crank 130, whose pin rests upon the bolt of a lock 129 in such a way that when the bolt is elevated by turning the key of the lock the crank 130 is revolved, which in turn rotates the shaft 131 and throws the releasing-rod 132, thus releasing the plate 82 and the attached index, which drop by their weight to the zero position. This completes the description of the registering mechanism. The four dials are capable of indicating a total sum of ninety-nine dollars and ninety-nine cents, after which point is reached the additional registration of one cent will bring all the dials to zero again and simultaneously raise the index upon the graduated scale one division. Therefore one division of the scale stands for one hundred dollars.

The slip-printing mechanism which I propose to employ in my register is illustrated in Figs. 18 to 22. A platform 89^a, suitably fixed within the register-casing, may be employed to support the printing mechanism. Four type-disks 89 are provided to correspond to the four series of chutes, and upon the periphery of each of the type-disks are placed type 92 for printing the ten numerals.

90, Fig. 19, represents axles for the intermediate type-disks, which axles are independently journaled in suitable bearings 90^a, supported by the case 1. The outer type-disks are secured to sleeves 91 upon the axles 90, and these sleeves are loose, so that the four type-disks may rotate independently of each other.

90^b represents a helical spring upon the axle 90 and so attached at its ends to the axle and the bearing 90^a that the axle 90 when the inner type-disks are released is brought to its normal position. 91^b represents a similar spring upon the sleeve 91, and it serves a like purpose with the outer type-disks.

When the type-disks 89 are in a normal position, the "0" type is opposite a strip of paper or other substance upon which the impression is to be made.

The type-disks are adapted to be set to the proper printing position through the limit-arms 24, which receive when actuated by a gravity-piece a movement proportional to the value of the chute through which the gravity-piece is passed.

88, Figs. 18 and 21, represents a rod at-

5 attached to the pivot 27 upon the limit-arm 24. This rod transmits the motion of the limit-arm to a shaft 88^a, journaled in fixed brackets 88^{a'} and 88^{a''}, Fig. 2, through one of two arms 88^b upon the shaft 88^a. To the second of the arms 88^b is pivoted a rod 88^c, extending downward and having at the lower end thereof a slotted portion 88^d, sliding upon a pivot 88^e. In the case of the first type-disk the pivot 88^e is placed directly upon the face of the disk, as shown in dotted lines in Fig. 21, and thus serves when the limit-arm is raised to rotate the type-disk 89 in the direction of the arrow in Fig. 21. By a suitable arrangement this rotation is made to bring the proper type opposite the strip 103, where it is in proper position for printing thereon the desired number. In the case of the remaining type-disks the pivot 88^e is placed upon one arm of a bell-crank lever 88^f, supported upon a bracket 88^g, attached to the register-case. Upon the other arm of the bell-crank lever 88^f is pivoted a rod 88^h, whose far end is pivoted at the end of a radial arm 88ⁱ, attached to the proper type-disk 89 in such manner that the elevation of the limit-arm 24 will produce a corresponding rotation of the type-disk 89, as in the case of the first type-disk described.

30 92^a represents a series of teeth upon the periphery of the disk 89 corresponding to the type 92 and adapted to engage with a spring-actuated catch 93 to support the disk 89 in the printing position to which it has been set by the limit-arm 24. The slotted piece 88^d allows the return of the limit-arm 24. 93^a represents a spring for holding the catch 93 against the teeth 92^a. This spring bears upon an arm 93^b, mounted on the same rod 93^c with the four catches 93, said rod being journaled at 93^d. In order that each catch may serve to act as a ratchet independently of the others, a construction such as is shown in Fig. 21 may be employed, permitting each catch to give with the rotation of its type-disk 89, yet the four being under control of the spring 93^a through the rod 93^c. This is accomplished by means of a joint formed in the arms or catches 93 and a small curved spring attached on one side of said joint and bearing upward upon the other side. A light spring similar to 93^a may, however, be substituted for the jointed arm 93. When all the type-disks 89 have been thus set to the figures to be printed, a printing-rod 100 may be pressed inward by hand, a button 118 upon its outer end being provided for that purpose, and in this way is a sufficient force acquired to effect the printing and cutting-off operations. The printing-rod 100 is provided with a bearing 100^b, Fig. 18, in the case and is supported at its inner end by guide-pins 100^a.

100^c represents a supporting-bracket, which serves to confine a spring 119.

65 100^d represents a collar attached to the printing-rod 100, upon which the spring 119 acts to force the rod 100 and the button 118

outward on being released after the inward movement.

96, Figs. 21 and 22, represents a platen situated behind the strip 103 for pressing the strip against the type 92. The upper end of the platen is pivoted in two supports 94 and 95, which are secured to the register-case. The lower end of the platen 96 is provided with an extension 97, upon which is an inclined cam 98, adapted to engage a similar cam 99 upon the printing-rod 100 when the rod is pushed inward, and thereby to cause the platen to press the strip 103 against the type, which, being set, make an impression upon the strip showing the amount registered.

120 represents a flat spring rigidly connected to the shaft of the platen 96 and also secured to a supporting-angle 120^a, attached to the support 95, and the spring 120 is adapted to return the platen 96 to its original position when released.

110 and 111 represent a pair of knives for cutting the printed slips from the strip 103. The knife 110 is attached to the platen 96 and is situated upon the same side of the strip 103 as is the platen. The knife 111 is upon the opposite side of the strip and is firmly attached to the case of the register.

The cam 99 upon the rod 100 is shown in Figs. 19 and 20. 114 and 115 represent other cams, and 104 represents a rack upon the inner end of the printing-rod.

Referring to Fig. 18, the strip 103 is shown to be supplied by a roll suitably supported outside the register-case.

103^a represents a guiding-slot in the case 1, through which the strip passes to a feed-wheel 102, which serves to feed the strip 103 to the type-disks 89.

Referring to Figs. 21 and 22, the feed-wheel 102 is shown mounted upon an axle 101, which is journaled in the support 95.

105 represents a pinion which is constantly in mesh with the rack 104 upon the rod 100, and the pinion is secured to a sleeve 106, which is loose upon the axle 101. Also secured to the sleeve 106 is an arm 107, which carries a pawl 108, and this pawl is adapted to engage with the teeth of a ratchet 109, secured to the axle 101. When the printing-rod 100 is pressed inward, the sleeve 106 is rotated through the rack and pinion and the pawl 108 slips around the ratchet 109. The return motion of the rod 100 causes the rotation in the reverse direction of the sleeve 106 and the consequent rotations of the feed-wheel 102 through the ratchet 109 and pawl 108. A pressure-wheel 112, Fig. 18, pressed by a spring 113, serves to hold the strip against the feed-wheel 102, so that when the feed-wheel is rotated a suitable length of strip is forced between the knives 110 and 111, and so between the platen 96 and the type-disks 89, where it remains until a subsequent printing operation.

114 represents a laterally-projecting cam

upon the rod 100. It is adapted, after the cam 99 has passed the cam 98 and released the platen 96, to engage a pivoted finger 116, Fig. 21, and by pressing it outward and against the inclined end of a releasing-lever 117 to depress that end of the releasing-lever and elevate the other end, and thereby release the catches 93, which bear upon the releasing-lever. In this way the type-disks 89 are released, and the helical springs 90^b and 91^b cause them to return to the normal or zero printing position. 115 represents a similar cam upon the printing-rod 100. It is adapted at the completion of the return motion of the rod 100 to engage the finger 116, as shown in Fig. 19, and to force it back to its original position, thus freeing the releasing-lever 117 and allowing the catches 93 to once more engage the teeth 92^a of the type-disks 89. To describe the operation of these parts, we must suppose a purchase to have been registered by the operator. This requires the passage of one or more gravity-pieces through a like number of chutes and the consequent proportional elevation of the limit-arms. This movement is transmitted through the connections described to the type-disks 89, and it serves to bring the proper type of each type-disk to the printing position, which is opposite to the platen 96, in which position the catches 93 hold the type-disks, while the limit-arms 24 drop back again and the other parts come to rest. The type-disks being properly set to print the amount of the purchase upon the strip 103, the printing may be accomplished by pressing inward the button 118 upon the printing-rod 100. During the inward movement of the printing-rod 100 the cam 99 upon the rod 100 pressing against the cam 98 upon the platen 96 causes the latter to press the strip against the type, thus indenting it with the figures representing the amount of the purchase, and simultaneously the knife 110, carried by the platen, shears with the knife 111 and severs the printed slip, which drops into the drawer below. The cam 99 being carried by then disengages the cam 98, and the cam 114 then comes into play. By means of the finger 116 and the lever 117 the cam 114 removes the catches 93, which support the type-disks, and the latter return to their zero or normal position, actuated by the helical springs 90^b and 91^b. During the entire inward movement of the printing-rod the rack 104 upon the rod 100, which is in mesh with the pinion 105, rotates the latter, and the pinion in turn causes the pawl 108 to slip around the ratchet 109, which is secured to the axle 101, carrying the feed-wheel 102. The inward movement being completed, the rod 100 is released, and the spring 119 acting upon the rod forces it out again to its normal position. The rack 104 during this movement rotates the pinion 105 in the reverse direction, and the pawl 108 engages the ratchet 109, rotates it, and with it the

axle 101 and the feed-wheel 102. The strip 103 being pressed by the pressure-wheel 112 against the feed-wheel is fed forward to replace the portion cut off by the knives 110 and 111. Near the completion of the outward or return movement of the printing-rod the cam 115 thereon engages the finger 116 and forces it back to its original position, thus releasing the releasing-lever 117 and the catches 93, which, pressed by the springs 93^a, again engage the teeth 92^a of the type-disks. The parts are then in their original position and ready for a new printing operation.

124 represents a cash-drawer, Figs. 1 and 2.

128 represents a gong adapted to be rung by the opening of the drawer 124.

127 represents a support in which is pivoted a bell-crank lever 126, the horizontal arm of which rests upon a flat spring 140, which spring is rigidly fastened at one end to the register-case 1 by a block 139, while the other end of the spring carries a hammer 141, situated directly beneath the gong 128.

125 represents a catch projecting from the drawer 124, and it is adapted to strike the vertical arm of the bell-crank lever 126 when the drawer is opened and by rotating the bell-crank lever to depress the spring 140. When the catch 125 has passed and released the bell-crank lever 126, the spring 140 is released and it flies up, carrying with it the hammer 141, which is thus made to strike the gong and to ring it. The gong 128 is also adapted to be rung when a record is made. 143 represents a hammer for this purpose. It is secured by an arm to a shaft 142, which runs the whole width of the machine and is suitably journaled at its ends, as in brackets 142^a, secured to the register-case. 144 represents bent arms attached to the shaft 142. These arms project at right angles from the shaft, and their bent portions pass within the frames 23, which, it will be remembered, are elevated by the arms 15, Figs. 14 and 15, when a gravity-piece is dropped into one of the chutes. This frame 23 elevates the bent arm 144, passing within the frame, and so rotates the shaft 142 and elevates the hammer 143, which when the gravity-piece has passed from the chute and the arm 15 and the frame 23 have dropped falls upon the gong 128 beneath it and rings the gong.

121, Figs. 1 and 2, represents a push-rod, the purpose of which is to release all the display-disks and type-disks and allow them to return to their normal position. When the button 146 upon the outer end of the rod 121 is pressed inward, a crank 148 upon a vertical shaft 133 is turned by the rod 121, which is pivoted to the crank-arm. The shaft 133 is journaled in brackets 147, which are fastened to the rear of the frame. At the upper end of the shaft is provided a second crank 149.

134 represents a shaft with bearings at 151 on both sides of the machine. Upon the shaft 134 are secured two pins 150, between which

the wrist of the crank 149 plays, so as to move the shaft 134 longitudinally when the crank-shaft 133 is rotated.

135 represents rigid bent rods secured to the shaft 134 and which at their other ends bear against the arms 11, Fig. 17, upon which are supported the display-rods 17 by the catches 19. When the button 146 is pushed inward and the crank 148 is turned, the crank-shaft 133 communicates the motion to the crank 149, whose wrist bearing upon the pins 150 slides to the left, Fig. 1, the shaft 134, thus releasing the catches 19 of any of the display-rods 17 which may be elevated and letting drop the attached display-disks.

152 represents a rod (shown dotted in Fig. 1) which is also attached to the shaft 134 and the lower end of which is bent at right angles. This bent part engages with the forked end 154 of an arm 153, Fig. 21, which arm forms part of a bell-crank lever pivoted to the supporting-bracket 155. 156 represents the second arm, which extends horizontally to a point directly beneath the releasing-lever 117. The arms 153 and 156 are fixed at opposite ends of a rod 156^a, journaled in said bracket 155. When the button 146 is pushed and the shaft 134 slides to the left, it carries with it the bent rod 152, which acting on the arm 153 of the bell-crank lever rotates it to the left, thus raising the arm 156 and the releasing-lever 117, and thereby causing the catch 93 to release the type-disks 89 and allow their return to the normal or zero position.

122, Figs. 2 and 4, represents an inclined raceway for the gravity-pieces. There is provided one of these raceways for each series of chutes. When a gravity-piece is passed through a chute, it drops into the inclined raceway and slides or rolls down the raceway and through an opening 122^a in the front of the machine into a trough 123, where it is handy for a new operation.

To bring the registering-dials to the starting or zero position, an amount is registered equal to the difference between one hundred dollars and the total previously-registered amount, and if then the key is turned in the lock 129 the index upon the sliding scale is released and also drops to zero.

What I claim as my invention is—

1. In a cash-register the combination with a series of gravity-chutes, of a registering device and means operated by the passage of a gravity-piece through any of said chutes, whereby a differential movement may be imparted to said registering device, substantially as specified.

2. In a cash-register the combination with a number of gravity-chutes segregated into series, of a registering device for each of said series and means operated by the passage of a gravity-piece through any chute of the corresponding series, whereby a differential movement may be imparted to said registering device, substantially as specified.

3. In a cash-register the combination with a number of gravity-chutes segregated into series, of a number of dials for registering amounts, and means operatively connecting each of said dials with the corresponding series of chutes, whereby the chutes of the series may register differential amounts on the dial, substantially as specified.

4. In a cash-register the combination with a series of gravity-chutes of a dial or other registering device in connection with said chutes, and means operated by the unaided passage of a gravity-piece through any of said chutes, whereby a differential movement may be imparted to said registering device, substantially as specified.

5. In a cash-register the combination of a series of chutes, a register, and means operated by the passage of a piece through a chute, whereby the series of chutes may effect a differential movement of said register.

6. In a cash-register the combination with a series of chutes for gravity-pieces, of arms within said chutes adapted to be actuated by the passage of said gravity-pieces, a registering device, and means whereby the movements of said arms may effect differential movements of said registering device, substantially as specified.

7. In a cash-register the combination with a number of gravity-chutes segregated into series, of a registering device for each of said series of chutes, means connecting said registering device with said chutes whereby the passage of a gravity-piece through any of said chutes actuates said registering device, and means for transferring registered amounts from one of said registering devices to another thereof, substantially as specified.

8. In a cash-register the combination of a number of gravity-chutes segregated into series, a counting device appurtenant to each series, and means for operatively connecting the several counting devices and transmitting motion from a counting device of low value to one of higher value, substantially as specified.

9. In a cash-register the combination of a number of gravity-chutes segregated into several series, a registering dial or index appurtenant to each of said series, means for transforming the complete revolutions of said dial or index into a partial revolution of the next higher dial or index, and means for operating said registering dials or indices by the unaided passage of a gravity-piece through any of said chutes, substantially as specified.

10. In a cash-register the combination of a number of gravity-chutes, registering devices operated by the unaided passage of a gravity-piece through any of said chutes, and means connecting the said registering devices, whereby a given amount of movement of one will be transferred, and transformed into a lesser amount of movement in another thereof, substantially as specified.

11. In a cash-register the combination with

a series of registering dials or indices operated through the fall of a gravity-piece, of a mechanism connecting said dials or indices for transferring a given movement of one of said dials or indices to the next thereof, said mechanism comprising means for disconnecting one of said dials or indices, and advancing the same, substantially as specified.

12. In a cash-register the combination with a number of gravity-chutes, of a registering device operated by the passage of a gravity-piece through any of said chutes, said registering device comprising a number of counting devices, axles actuated through gear for operating said counting devices, and means for removing said axles from gear, substantially as specified.

13. In a cash-register the combination of a registering device, said registering device comprising a number of counting devices, axles for operating said counting devices actuated through gearing, means for taking said axles out of gear, means operated by the movement of another counting device for rotating said axle, while the axle is out of gear, and means for independently operating each of said counting devices, substantially as specified.

14. In a cash-register, a registering device comprising a number of counting devices, an axle for operating each of said counting devices, a series of gravity-chutes, a gear operated through said series of chutes for rotating said axle, a cam for taking said axle out of gear, and means operated by another of said counting devices for rotating said axle at given periods of the movement of said last-mentioned counting device, substantially as specified.

15. In a cash-register, a registering device comprising a number of counting dials or indices, an axle for operating each of said dials or indices, a connecting-rod for removing from gear said axle, said connecting-rod operated through a cam by the movement of the adjacent counting dial or index, a supplementary connecting-rod for operating a non-adjacent connecting-rod, and means for putting said supplementary connecting-rod into operation at given periods in the movement of the corresponding counting dial or index, substantially as specified.

16. In a cash-register the combination with a number of gravity-chutes, of a number of counting dials or indices, a mechanism operatively connecting said dials or indices with said chutes, a locking pawl and ratchet comprised in said mechanism for preventing an overmovement of the said dial or index, and a cam for permitting the engagement of said pawl and ratchet at the completion of the movement of said dial or index, substantially as specified.

17. In a cash-register, a series of indicating and registering devices operated by the fall of a gravity-piece, the one indicating the highest value comprising a sliding piece

whose movement in one direction records, and in the other direction expunges the record, and means operated by the next device for moving said sliding piece, substantially as specified.

18. In a cash-register, a series of registering dials or indices, gravity-chutes for operating each thereof, means whereby each of said dials or indices is operated by a given movement of the next lower thereof, and a sliding piece operated by the highest of said dials or indices, for registering still higher amounts, substantially as specified.

19. In a cash-register having a registering device and a display device, the combination of a receptacle adapted to retain gravity-pieces, passages leading from elevated positions back to said receptacle, whereby when a gravity-piece is placed into any of said passages gravity will return it to said receptacle, means actuated by said gravity-piece in its said passage for operating said registering device, and means actuated by said gravity-piece for operating said display mechanism, substantially as specified.

20. In a cash-register, having a registering device, and a display device, the combination of a mechanism for operating said display device whereby any previous display is expunged and a new display substituted at the same operation, a mechanism for operating said registering device, a series of gravity-chutes, and means whereby the continuous passage of a gravity-piece through any chute may operate both the aforesaid mechanisms, substantially as specified.

21. In a cash-register the combination of a series of gravity-chutes, a receptacle for gravity-pieces from which a gravity-piece may be carried by hand and placed into one of said chutes, the said chutes being so arranged that the action of gravity may cause the gravity-piece to make a continuous passage through the chute and into the said receptacle, a display device, and means in connection with said chutes for operating said display device substantially as specified.

22. In a cash-register, the combination of a number of gravity-chutes segregated into series, a display device appurtenant to each series, and a mechanism operatively connecting the said chutes and the display device, whereby when a gravity-piece is passed through any chute of the series, the preceding display corresponding to the said series will be expunged, and the new display effected in the same operation, substantially as specified.

23. In a cash-register the combination with a series of gravity-chutes, of a corresponding series of display-disks operated by the unaided passage of a gravity-piece through any of said chutes, means for maintaining said disks in displaying position, and means for releasing the same operated by a subsequent passage of a gravity-piece, substantially as specified.

24. In a cash-register the combination of a

gravity-chute, an arm projecting into said chute, and a display-disk in operative connection with said arm, whereby the unaided passage of a gravity-piece through said chute
5 may actuate said arm to operate said display-disk, substantially as specified.

25. In a cash-register the combination of a number of gravity-chutes segregated into series, a series of display-disks for each of said
10 series of chutes, and means for operating said disks by the unaided passage of a gravity-piece through any of said chutes, said means comprising arms fitted to intercept the said gravity-piece in the passage, and be forced out
15 of the path thereof, substantially as specified.

26. In a cash-register the combination with a series of gravity-chutes, of a corresponding series of display-disks, a registering device, and means for operating the same by the un-
20 aided passage of a gravity-piece through any of said chutes, whereby the chutes of the series may impart a differential movement to said registering device, substantially as specified.

27. In a cash-register the combination with a number of series of gravity-chutes, of a counting and recording device appurtenant to each series, a display device in operative
30 connection with said chutes, and means connecting the several counting devices, whereby a given amount of movement of one of said counting devices will be transferred and transformed into a less amount in another thereof, substantially as specified.

28. In a cash-register the combination with a series of counting devices, of means for operating each thereof by the unaided descent
40 of a gravity-piece, means whereby each of said devices is operated by a given movement of the next thereof, and a series of display devices corresponding to said counting devices, substantially as specified.

29. In a cash-register the combination with a series of gravity-chutes, of a registering
45 device, and means for operating said device, said means comprising a stepped engaging piece, and arms operated by the fall of a gravity-piece in any of said chutes for engaging the steps of said engaging piece, whereby
50 a movement corresponding to the value of the operating-chute is given said engaging piece, substantially as specified.

30. In a cash-register the combination with a number of gravity-chutes segregated into
55 series, of a registering device appurtenant to each series, and means for operating said registering device, said means comprising a stepped engaging piece operated by the passage of a gravity-piece through any of said
60 chutes, substantially as specified.

31. In a cash-register the combination with a registering device, of means for operating the same, a stepped engaging piece comprised in said means, and arms operated by gravity
65 for engaging the steps thereof, whereby a variable movement may be imparted to said engaging piece, substantially as specified.

32. In a cash-register the combination with a registering device, of a number of arms for operating the same, means actuated by grav-
70 ity for moving said arms, and means for rendering said arms operative or inoperative at different points in the movement thereof, whereby a variable movement is imparted to
75 said registering device.

33. In a cash-register the combination with a display device, of a registering device, a stepped engaging piece for operating said de-
80 vices, and means actuated by gravity for operating said engaging piece by engaging the steps thereof whereby a varying movement may be imparted to said engaging piece, sub-
stantially as specified.

34. In a cash-register the combination with a register, of a device for operating said reg-
85 ister, and means operated by the fall of a gravity-piece for imparting a variable movement to said operating device, substantially as specified.

35. In a cash-register the combination of a
90 number of gravity-chutes segregated into series, a registering device appurtenant to each series, a series of arms for operating said device, means for moving said arms, and means for rendering said arms operative for a vari-
95 able portion of their movement, substantially as specified.

36. In a cash-register the combination with a series of gravity-chutes of a printing de-
100 vice and means operated by the passage of a gravity-piece through any chute of said series whereby a differential movement may be imparted to said printing device, substantially as specified.

37. In a cash-register the combination of a
105 series of gravity-chutes, a type-disk, and means operatively connecting the two whereby the said chutes may effect differential movements of said type-disk.

38. In a cash-register the combination of a
110 series of gravity-chutes, a type-disk in connection therewith whereby said type-disk may be adjusted by the passage of a gravity-piece through any chute of said series, means for maintaining said type-disk in printing
115 position, and means for releasing the same, substantially as specified.

39. In a cash-register the combination with a series of gravity-chutes, of a registering
120 device and a printing device, means operated by the unaided passage of a gravity-piece through any of said chutes whereby a differential movement may be imparted to both of said devices, and a strip-feeding mechanism.

40. In a cash-register the combination of a
125 series of gravity-chutes, a printing device, means whereby the said chutes may effect a differential movement of said printing device, a strip-feeding mechanism, a platen, and means for pressing the strip between the
130 platen and the printing device.

41. In a cash-register the combination of a series of gravity-chutes, a printing device, a stepped engaging piece, and a series of arms

operated by the passage of a gravity-piece through any chute of said series, said arms being adapted to engage the step of said engaging piece whereby a variable movement may be imparted to said printing device.

42. In a cash-register the combination of a printing device, gravity-chutes representing different values, means operated from said chutes for adjusting said device to print the value represented by the chute from which it is operated, a strip for receiving an impression, and a single means adapted to feed said strip and effect the printing thereon.

43. In a cash-register the combination of a number of gravity-chutes segregated into series, a registering device, a printing device, and means operated by the unaided passage of a gravity-piece through any of said chutes, for giving to said registering and printing devices a movement corresponding to the number of the chutes.

44. In a cash-register, the combination of a registering device having a constant tendency to return to zero position, of means for effecting registers upon said device, means for retaining the said device in registering position, and a contrivance for releasing the said device, whereby it will return to zero, to expunge the matter registered.

45. In a cash-register the combination of a registering device, the said device acted upon by gravity or an equivalent force to return to a zero position, means for retaining the

said device in registering position, and a key-operated contrivance for releasing the said device.

46. In a cash-register the combination of a registering device, comprising a piece fitted to move upwardly and downwardly, means for moving said piece upwardly to effect registers upon said device, a pawl for retaining said piece in its elevated position, and a key-operated bolt for effecting the release of said piece, whereby the piece may descend to zero position to expunge the record or registers thereon.

47. In a cash-register the combination of a sliding scale comprising the highest registering device of said cash-register, teeth provided upon said scale, a pawl engaging said teeth, and actuated by the next highest registering device, for effecting registers upon the said highest registering device, a second pawl engaging said scale to retain it in registering position, and a contrivance controlled by a key, and adapted to act upon both the said pawls to release the said scale, whereby the registered amount may be expunged.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

PATRICK KENNY.

Witnesses:

WM. HERBERT KING,
GEO. E. CRUSE.