A. G. MEIER.

CALCULATING MACHINE.

APPLICATION FILED AUG. 13, 1906.

929,317.

Patented July 27, 1909.

5 SHEETS—SHEET 1.

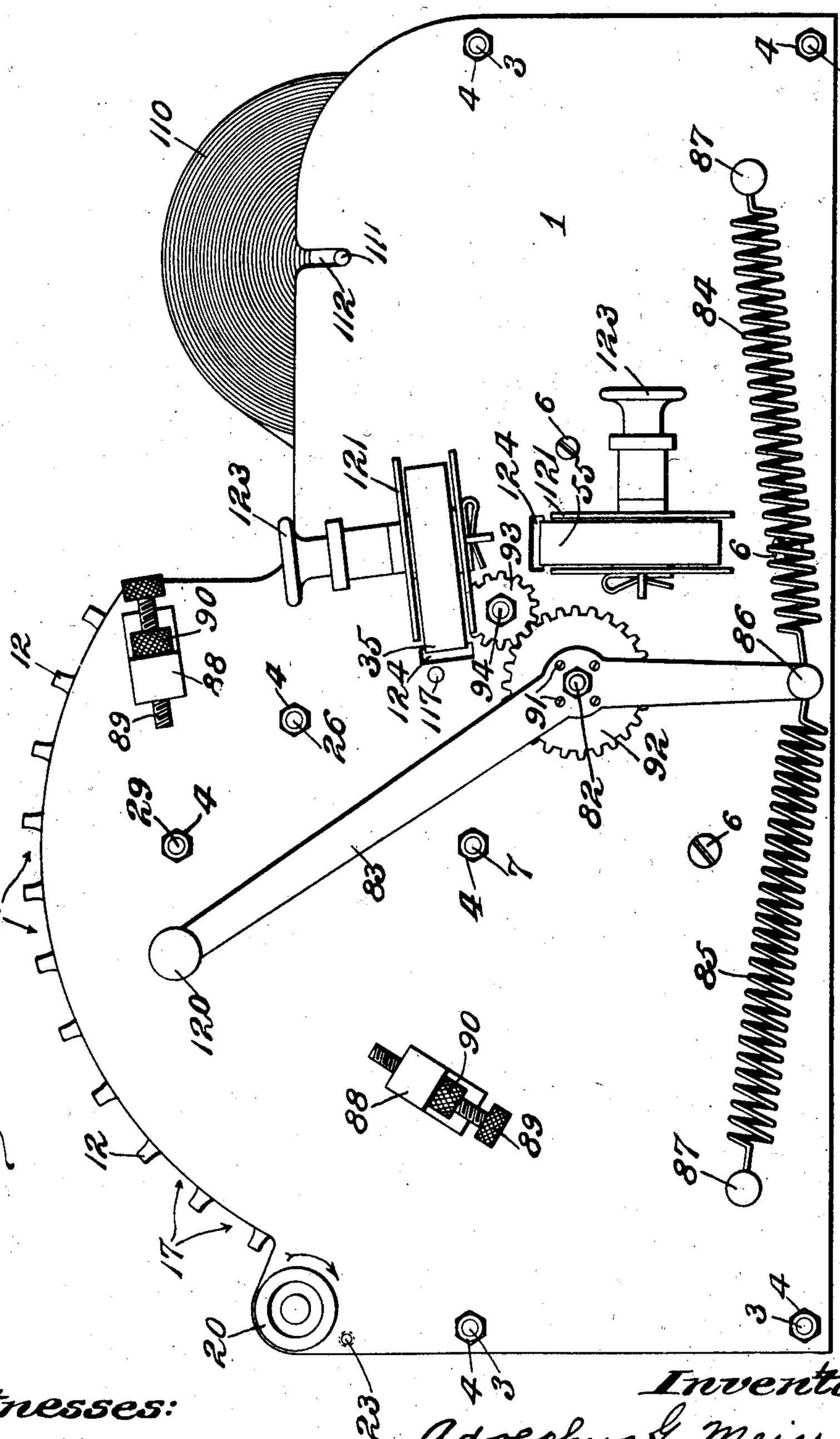

Fig. 1.

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5 SHEETS—SHEET 2.

Fig. 3.

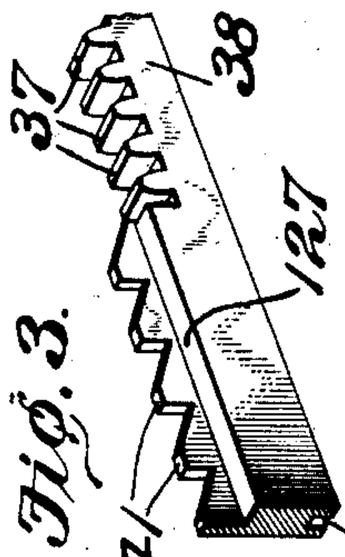

Fig. 2.

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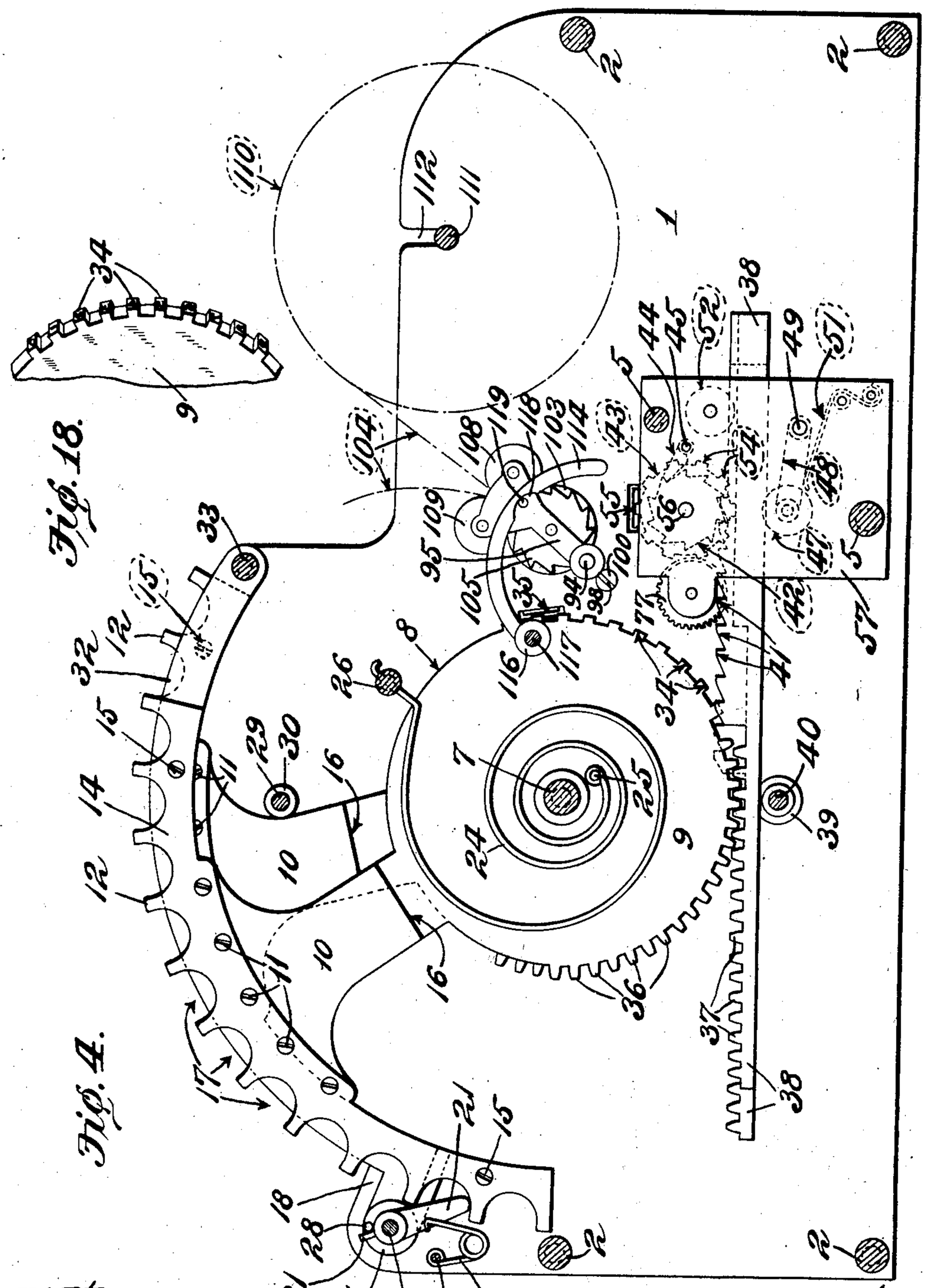

Fig. 18.

Fig. 4.

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5 SHEETS—SHEET 4.

Fig. 6.

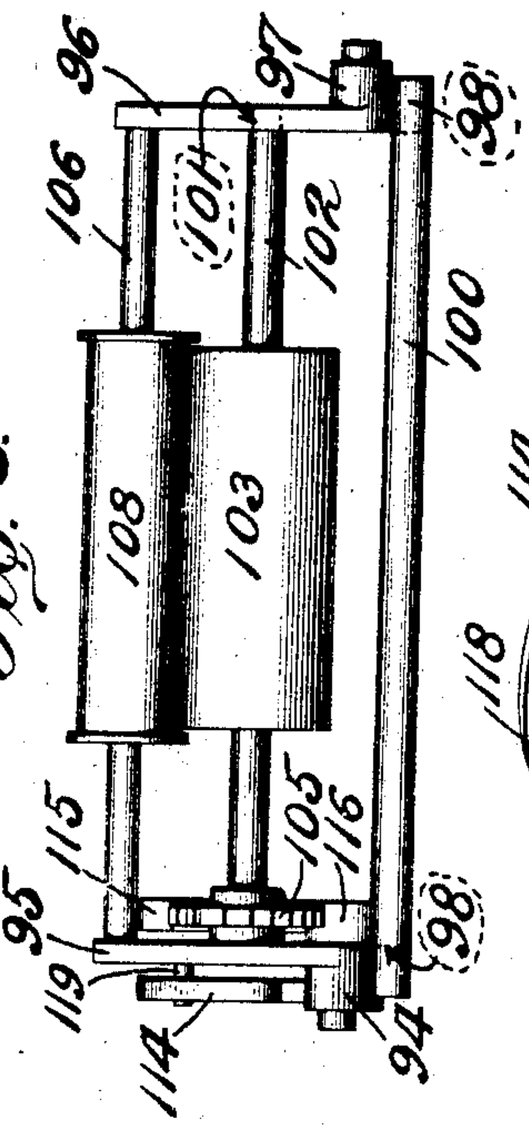


Fig. 8.

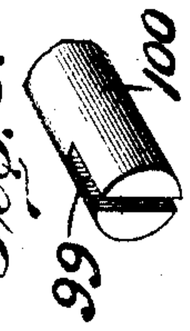


Fig. 7.

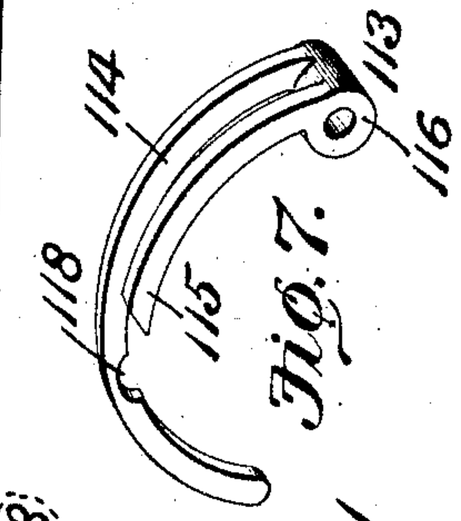


Fig. 9.

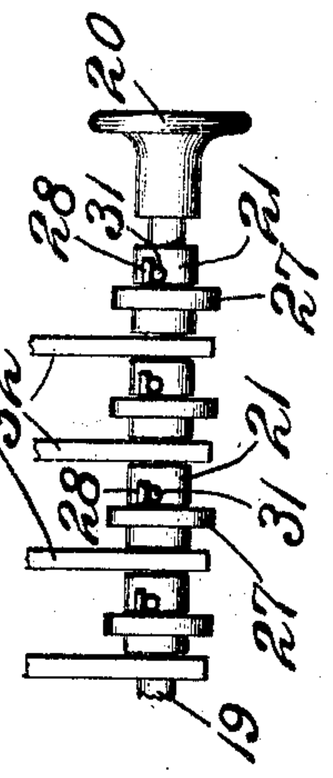
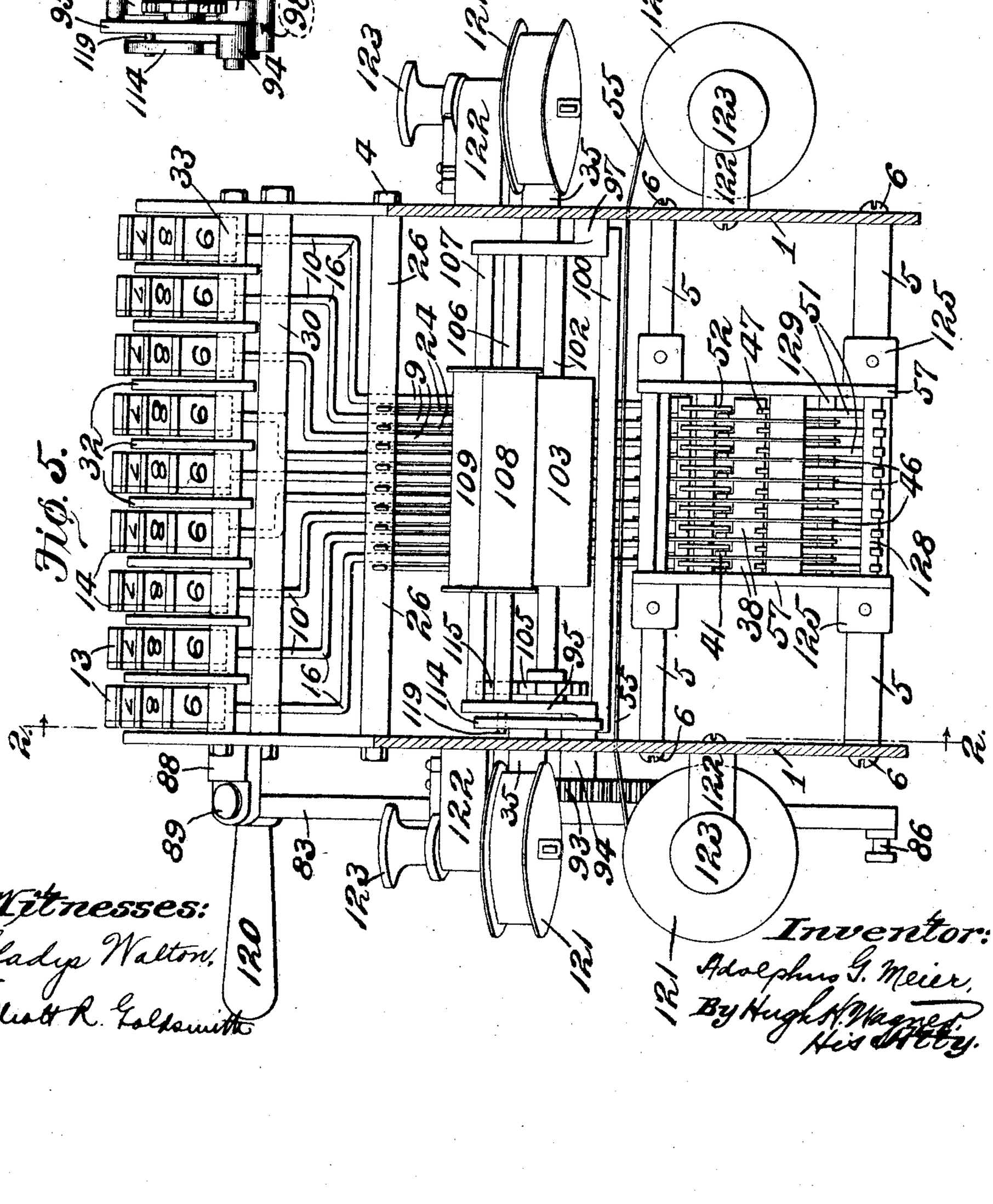


Fig. 5.



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5 SHEETS—SHEET 5.

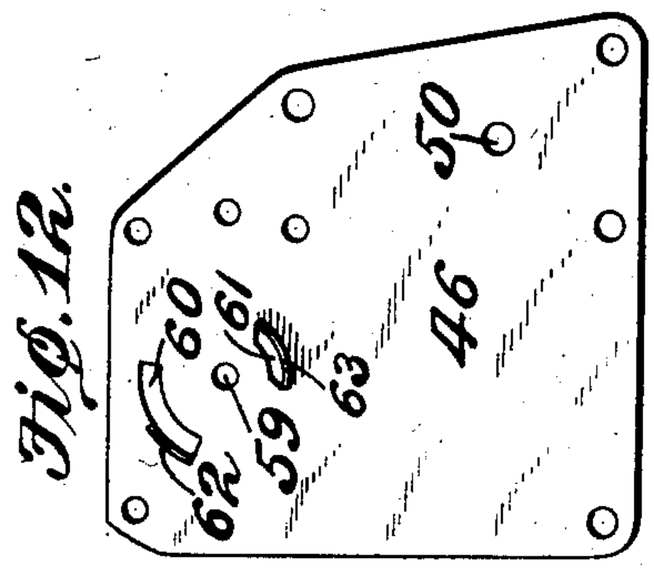

Fig. 12.

Fig. 13.

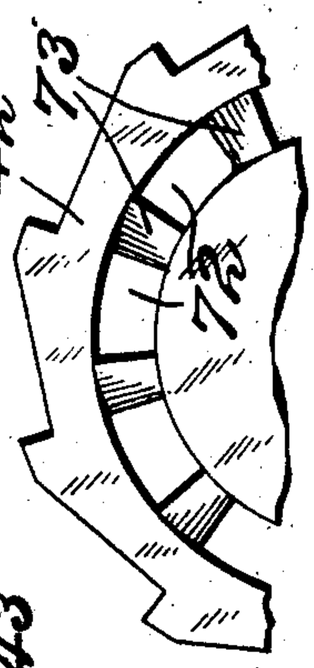

Fig. 17.

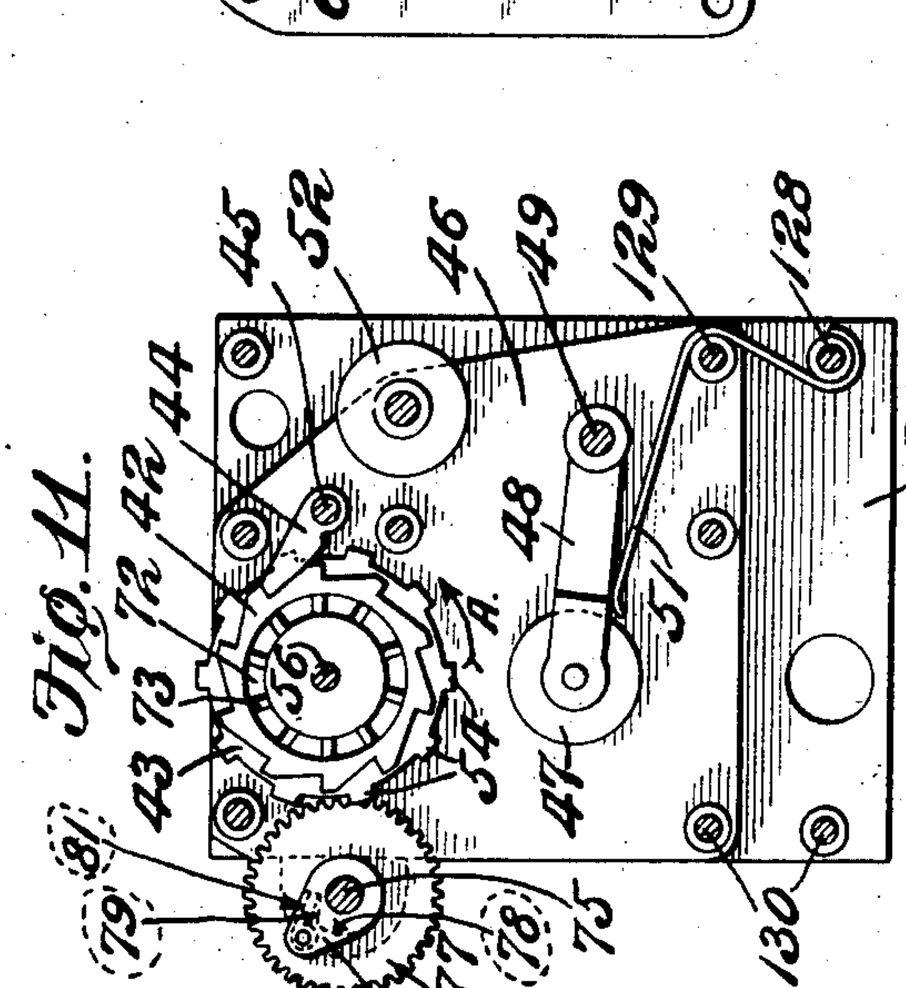

Fig. 11.

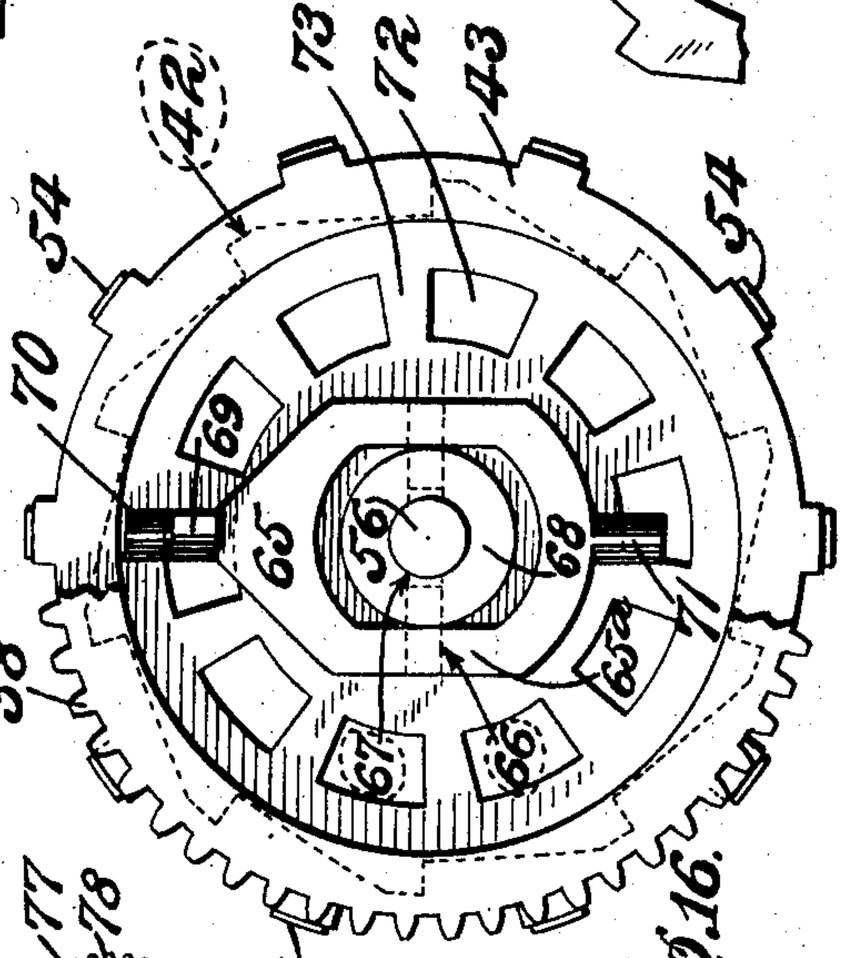

Fig. 16.

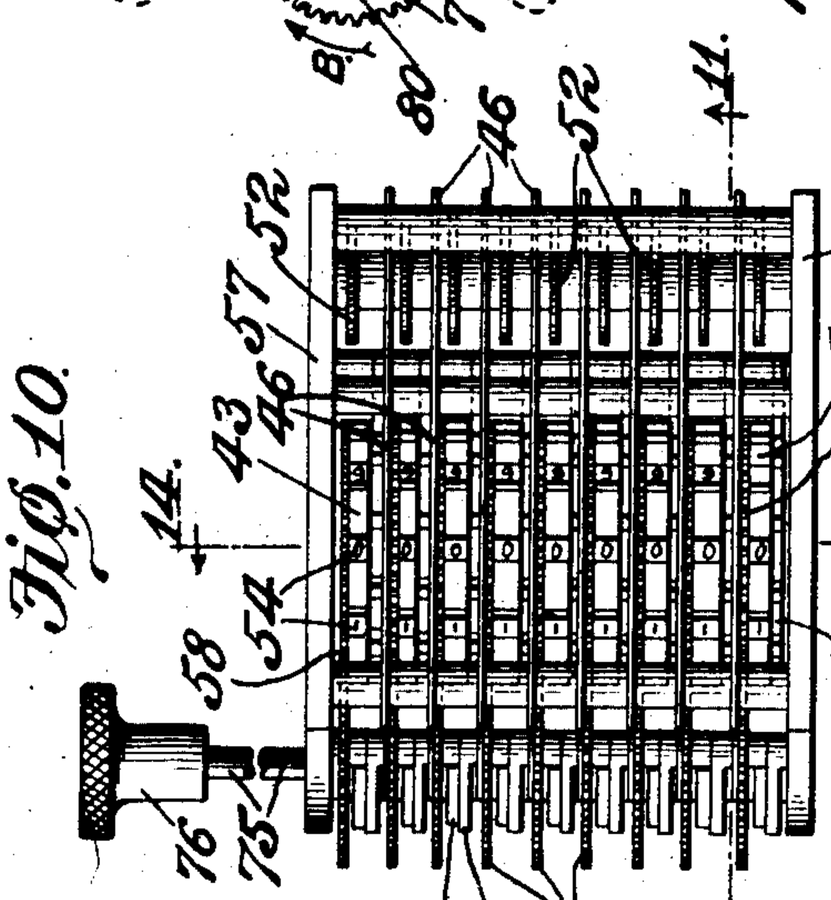

Fig. 10.

Fig. 15.

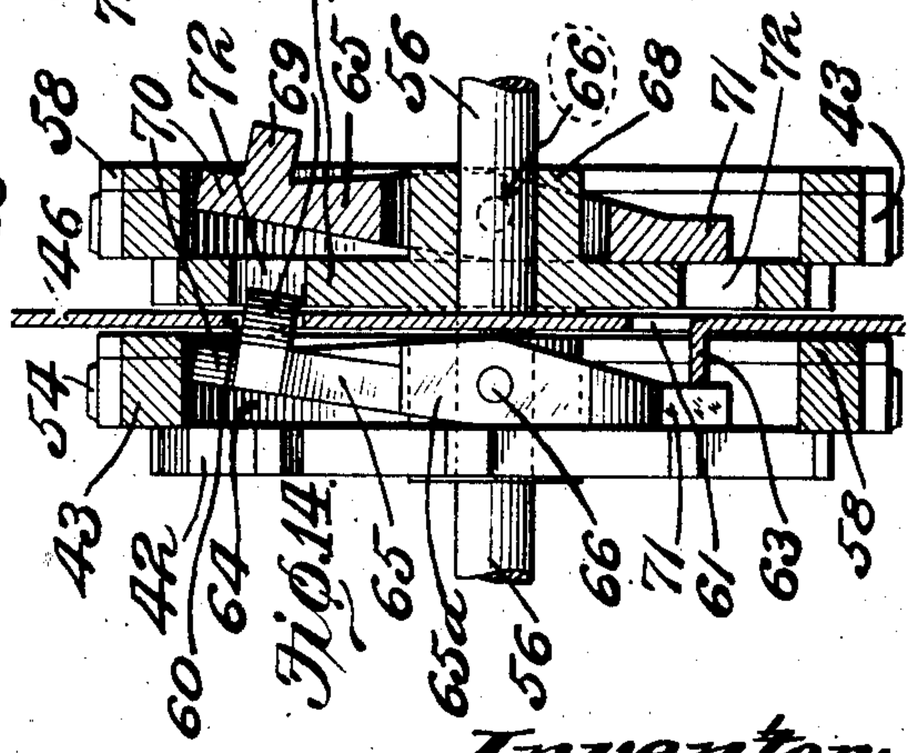

Fig. 14.

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His Attys.

UNITED STATES PATENT OFFICE.

ADOLPHUS G. MEIER, OF ST. LOUIS, MISSOURI, ASSIGNOR TO THE DUPLEX ADDING MACHINE COMPANY. OF ST. LOUIS, MISSOURI, A CORPORATION OF MISSOURI.

CALCULATING-MACHINE.

No. 929,317. Specification of Letters Patent. Patented July 27, 1909.

Application filed August 13, 1906. Serial No. 330,278.

To all whom it may concern:

Be it known that I, ADOLPHUS G. MEIER, a citizen of the United States, residing at the city of St. Louis, State of Missouri, have invented certain new and useful Improvements in Calculating-Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to machines for mechanically adding individual items or amounts into an aggregate or total, and especially to adding-machines of that class which are adapted to print the lists of such items or amounts that are registered, to add up such lists, and to print the total of the added items at any desired time.

In the drawings, forming part of this specification and in which like numbers of reference denote like parts wherever they occur, Figure 1 is a side elevation of the machine; Fig. 2 is a longitudinal view on the line 2—2, Fig. 5; Fig. 3 is a perspective detail of a part of one of the rack-bars; Fig. 4 is another longitudinal view on the line 2—2, Fig. 5, showing the position of the parts after one of the finger-pieces has been depressed; Fig. 5 is a rear view, the outer rear-casing being removed; Fig. 6 is a perspective view of a part of the platen mechanism; Fig. 7 is a perspective view of the pawl that actuates the platen; Fig. 8 is a detail of the rod that cross-connects the arms which support the platen; Fig. 9 is a detail of the mechanism for releasing the sectors that have been actuated; Fig. 10 is a top plan view of the accumulating or totalizing mechanism; Fig. 11 is a longitudinal sectional view on the line 11—11, Fig. 10, looking in the direction indicated by the arrow in Fig. 10; Fig. 12 is a side elevation of one of the partition-plates that separate the individual adding-wheels of the accumulating mechanism; Fig. 13 is a top plan view of the same member; Fig. 14 is an enlarged sectional detail of a portion of the accumulating mechanism, on the line 14—14, Fig. 10; Figs. 15, 16, and 17 are details of other portions of the accumulating mechanism; and Fig. 18 is a fragmentary detail in perspective of one of the sectors.

The side-plates or panels 1 serve to support the various parts, and are combined with suitable back-, top-, front-, and bottom-plates (not shown) to form a casing for the machine, which plates are placed in position after the operating mechanism is assembled, said casing preventing dust and dirt from settling in the interior of the machine. Cross-rods 2 extend from one side to the other of the machine, said rods having screw-threaded, shouldered heads 3 which heads extend through suitable perforations in the side plates 1. Nuts 4 are screwed upon the heads 3 outside of the side-plates 1, which are thus firmly seated on the shoulders at the junction of the heads and rods, the cross-rods 2 and side-plates 1 being thereby bound together to form a skeleton in which the operating parts are mounted. Rods similar in construction and arrangement to rods 2 serve as shafts, or otherwise, to support certain operating parts, such rods being, for convenience, designated by specific reference numerals. Other cross-rods, 5, are provided for various purposes, these rods being tapped at their ends for the reception of screws 6, which are inserted through perforations in side-plates 1, and thus these rods, also, can be held fixed in any desired position. Rods 5, unlike rods 2, are not provided with heads adapted to extend through the side-plates 1, but are of the same length as the internal width of the machine. Thus, rods 5, with necessary parts attached thereto, can be placed in position in the machine after the skeleton, consisting of side-plates 1 and cross-rods 2, is assembled, and, since many of the operating parts are in pivotal relation to, or otherwise supported by, said rods 5, these parts may obviously be mounted on rods 5 and then the whole group of parts placed in, or withdrawn from, the machine, without its being necessary to remove the side plates 1 or to loosen any of the cross-rods 2.

Rotatably mounted on cross-rod or shaft 7 are the sectors 8, the number of sectors provided depending on the desired capacity of the machine. In the drawings, nine sectors have been shown, which gives the machine a capacity for listing any amount from 1 to 999,999,999; but the same construction may be employed, and the same mode of operation applied, whatever be the number of sectors and consequent capacity of the machine. These sectors consist of an approximately circular portion 9, and the radially-projecting arms 10, to which are secured, by means of screws 11, the arcuate keys or finger-pieces 12, composed of a wide

portion 13 of hard rubber, and a thin metal strip 14, the two sections being fastened together by suitable screws 15. For reasons which will hereinafter appear, the circular portions 9 of the sectors 8 are spaced apart the same distance as it is desired to have between the different columns of figures as they are printed, which distance is usually about one-fourth of an inch, or less. To place all the finger-pieces 12 within so narrow a compass, however, would prove inconvenient; so the radial arms 10, where necessary, are bent so as to be L-shaped, as at 16, and the result is that the parts of the arms 10 to which the finger-pieces 12 are secured, are spaced apart a considerably greater distance than are the circular portions 9 from which arms 10 project, and thus, the finger-pieces 12 may be made of such dimensions, and placed far enough apart so that the key-board, which consists of the finger-pieces 12, will be of a size convenient to operate, and will not be unnecessarily crowded.

The finger-pieces 12 are provided for the purpose of registering units, tens, hundreds, thousands, etc., by depressing the respective arms 10 and thereby partially rotating the respective sectors 8, the units-registering finger-piece being the one to the extreme left in Fig. 5, the tens-registering finger-piece being next, to the right, and then the hundreds, thousands, etc., following in order. Each of said finger-pieces is provided with a plurality of finger-holes or sockets 17. When the operator wishes to register the number that is to be listed and added, he depresses the appropriate key, or, if the number comprises more than one figure, the appropriate keys, the distance of such depression of each finger-piece governing, for the particular column which that key controls, the digit that is to be listed and added by the machine.

The numerals 9, 8, 7, 6, 5, 4, 3, 2, 1, and 0 are marked in the finger-holes 17, beginning toward the right in Figs. 1, 2, and 4, thus indicating the socket in which the operator's finger must be placed to secure the depression of any particular finger-piece the proper distance to print and add the desired number. When the finger-piece is depressed, it is moved in the direction of the arrow, Fig. 2, until the finger of the operator strikes against the stop 18, when, of course, the finger can be moved no farther. Accordingly, the extent to which the finger-piece can move at any one operation is determined by the act of the operator in placing his finger in a particular socket of such finger-piece, and depressing said finger-piece as far as possible. If, for example, it be desired to register and add "6", the finger of the operator will be placed in the socket designated by the numeral "6", and the finger-piece 12 thereupon depressed until the finger strikes stop 18.

Extending entirely across the machine, and journaled in openings in the side-plates 1, is a shaft 19, adapted to be turned by a knob 20 located exterior to the casing. Loosely pivoted on said shaft 19 are pawls 21, one pawl being provided for each finger-piece 12. Springs 22, secured to cross-rod 23, normally keep said pawls 21 in engagement with the finger-pieces 12, one such spring being provided for each of said pawls, and, as the finger-pieces are depressed by the operator, these pawls are forced into sockets 17, thus to retain the sectors 8, pending the printing operation, in any position to which they may have been rotated by the operator. When any finger-piece 12 is depressed, and the sector 8 to which it is attached thus caused to rotate upon the shaft 7, it is so moved against the resistance of a helical spring 24, one end of a spring 24 being secured to each sector at 25, and all the springs of the series being attached at their opposite ends to cross-rod 26. These springs normally tend to return the sectors 8 to the starting position shown in Fig. 2, but when any finger-piece 12 has been depressed, and its pawl 21 has been forced into one of the sockets 17, the finger-piece and its sector are thus locked in place.

Bosses 27 are firmly fixed on shaft 19, and, projecting from each boss 27, is a pin 28 adapted to engage a pawl 21. When shaft 19 is turned in the direction of the arrow, Fig. 1, by means of knob 20, the pins 28 coact on the pawls 21 which are thus forced out of the sockets 17 in which they may have seated, and the springs 24 thereupon return the sectors 8 to the starting position. In this manner, after any item has been listed or printed, and added into the machine, the sectors are all simultaneously returned to normal position, so that the operation may be repeated and further numbers added. Pins 31 secured to the pawls limit the return rotation of shaft 19, for, obviously, pins 28 can not pass pins 31, but will be caught thereby. A cross-rod 29, covered with rubber tubing 30, or other resilient material, against which the arms 10 of the sectors 8 may strike, forms a cushion-like stop to limit the return movement of the sectors and connected parts after the pawls 21 have been withdrawn from the sockets 17 in the manner above described.

As hereinabove stated, the finger-pieces 12 have a rubber portion 13, and a metal portion 14, and the pawls 21 are so located that they engage the metal portion, which will not wear out so quickly, leaving the rubber portion untouched save by the fingers of the operator.

A plurality of arcuate metal strips 32, supported at one end by a cross-rod 33 and at the other by shaft 19, is provided, and these strips serve as partitions to keep the various

finger-pieces 12 from coming into contact with one another.

Projecting radially from the circular portion 9 of each sector 8 are the type 34, by which the items that are to be added by the machine are listed or printed. These type bear the numerals 0, 1, 2, 3, 4, 5, 6, 7, 8, and 9, said numerals being arranged successively from right to left, Figs. 2 and 4. As each sector 8 is given a partial rotation upon the depression of the finger-piece 12 secured thereto, the type 34 borne by said sector are carried upward in an arcuate path until one of the type-faces is in juxtaposition to the ribbon 35. The parts are so proportioned that the depression of a finger-piece 12 to the extent permitted when the operator's finger is inserted in any particular socket 17 thereof will rotate the sector the distance necessary to leave the type-face 34 which bears the same numeral as that by which said particular socket 17 is designated raised to a point opposite the ribbon 35. Thus, to use the former example, if the operator should desire to print "6", he would insert his finger in the socket marked "6", depress the finger-piece as far as would be permitted with his finger in that socket, whereupon the pawl 21 would lock the sector in place by seating in socket 17, and, when the sector had been so locked, the particular type-face 34 that would be exposed to the ribbon 35 would be the one on which the character "6" appears. The return of the sectors to normal position resulting from the action of the springs 24 after the release of the sectors by actuation of shaft 19, obviously returns all the type-faces 34 to the position shown in Fig. 2, where no type at all are opposite the ribbon 35. If desired, the parts can be so constructed that, when sectors 8 are returned to normal position, the particular type-face 34 bearing the character "0" will be exposed to ribbon 35, this arrangement being preferred by many adding-machine users.

Formed integral with the circular portion 9 of each sector 8, are teeth 36, which mesh with the teeth 37 of a reciprocating rack-bar 38, there being one such bar for each sector. As the finger-pieces 12 are depressed, and the sectors 8 attached thereto rotated, the respective bars 38 are forced toward the right, Figs. 2 and 4, and, as the sectors are released and returned, the bars 38 are drawn back toward the left. Rollers 39, journaled on a suitable cross-rod 40, each support one rack-bar 38, and keep the teeth 37 thereof in constant mesh with the teeth 36 of the respective sector 8.

Near the forward end of each rack-bar 38 is a series of beveled teeth 41, and, as said rack-bars are advanced, these teeth 41 mesh with and drive the ratchet-wheels 42, which are secured to, or formed integral with, the adding wheels 43. Each rack-bar thus causes the appropriate adding-wheel 43 to rotate in the direction designated by arrow A, Fig. 11, and pawls 44, pivoted at 45 to the partition-plates 46, engage the teeth of each ratchet-wheel 42 and lock said ratchet- and adding- wheels against return movement. Rollers 47, supported in bifurcated yokes 48, pivotally mounted on cross-rod 49 which passes through the opening 50 in each of the plates 46, are normally retained in an elevated position by springs 51. Said rollers support and keep their respective rack-bars 38 in mesh with ratchet wheels 42, but another series of rollers 52 is provided to prevent undue upward motion of rack-bars 38, which, if permitted, would cause unnecessary wear and tear on the mechanism.

When the rack-bars 38 are returned to starting position, the pawls 44 having locked the ratchets 42 against return, the teeth 41 of the rack-bars ride over the teeth of the ratchets, and, as the rollers 47 are adapted to be forced downward against the pressure of springs 51, thereby allowing the teeth of the rack-bars to ride out of the teeth of the ratchets, the rack-bars 38 can be withdrawn toward the left, Fig. 2, without disturbing the adding-wheels 43 or retracting them from the position to which they may have been advanced.

On each adding-wheel 43 are placed ten type 54. The numerals 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, appear upon the type-faces 54 which radially project from each of the adding-wheels 43, and by same the sum of the numbers that have been added is printed. All parts are so proportioned that the depression of any finger-piece 12 rotates the appropriate adding-wheel thirty-six degrees every time that "1" is to be added by said wheel, twice so far when "2" is to be added, and so on, the amount of rotation depending upon the digit that is to be added. At each operation of any key 12 accordingly, the adding-wheel controlled thereby is rotated, from the position in which it was last at rest, a distance sufficient to leave exposed to ribbon 55 the type-face representing the sum of the digit to be added and the one that was last in that position. Thus, if it should be desired to add "6", the finger-piece 12 controlling the proper column would be depressed, as heretofore explained, and the proper rack-bar 38 thereby advanced the distance necessary to rotate its adding-wheel 43 sufficiently to leave the particular type-face bearing the figure "6" exposed to ribbon 55, assuming that the adding-wheel had been at "0" when the operation began. If the type-face "2" of the adding-wheel had been exposed to the ribbon, it would have been advanced to "8", and so on, suitable "carrying" or "transfer" mechanism being provided, by means of which each time an adding-wheel passes from "9" to "0", one unit (or ten or hun-

dred, etc.) is carried or transferred to the wheel next higher in the series (the one adjacent on the right, Fig. 5), by advancing the latter wheel one number.

The various adding-wheels 43 are mounted to revolve idly on a shaft 56, which is supported by the side-plates 57. The ratchet-wheel 42 connected with each adding-wheel is located on one side thereof, while, on the side opposite, is secured a gear-wheel 58. Each adding-wheel is separated from the one adjacent by a partition-plate 46, which plates, as depicted most clearly in Fig. 12, have perforations 59 through which shaft 56 is adapted to pass, and two arcuate slots 60 and 61. Attached to each partition-plate 46, or formed integral therewith by bending back at right-angles to the plane thereof the pieces of metal that are stamped out in punching the slots 60 and 61, are cams 62 and 63. The interior of each adding-wheel 43 is hollowed out, and in the cavity 64 so formed is placed a pawl 65. These pawls are constructed in the manner shown in Fig. 16, having an enlarged middle loop-like part 65^a which surrounds the shaft 58, from which part pins 66 project into recesses 67 provided therefor in the hub 68 of each adding-wheel 43.

Each pawl 65 has a stud 69 projecting therefrom, and, also, has extended portions or heads 70 and 71. These pawls normally remain in a position with their studs 69 retracted as far inward as possible *i. e.*, toward the left, Fig. 14), but, as each adding-wheel is rotated to the point where it is desired to make the transfer, the lower end 71 of the pawl carried by said adding-wheel rides up on the proper cam 63. This forces the other end of the pawl outward, and causes stud 69 to project through slot 60. Each ratchet-wheel 42 is provided with a plurality of sockets 72, separated by the beveled webs 73, and as each pawl 65 is thrown into operative position by cam 63, stud 69, projecting through slot 60, sinks into one of the sockets 72. As each adding-wheel revolves, stud 69 of the pawl carried thereby strikes one of the webs 73 of the adjacent wheel, and thus each wheel rotates in unison with the wheel next higher in the series during such length of time as its pawl is thus permitted to protrude through the adjacent slot 60. In order to withdraw the pawls, cams 62 are provided, and, as the wheels 43 rotate, the heads 70 of the pawls ride up on said cams, and the pawl carried by each adding-wheel is thereby lifted out of engagement with the adjacent adding-wheel. The size of the parts, and their arrangement is such that each pawl is permitted to project through its slot 60 during the time that the adding-wheel by which it is carried is passing from "9" to "0", and no longer. During such time, therefore the "transfer" is made, and at each revolution of any one adding-wheel 43, one unit, (or ten, or hundred, etc.) and only one, is transferred or carried to the wheel next higher in the series, the latter wheel being advanced one number.

It will be observed, by reference to Figs. 2 and 4, that when any rack-bar 38 is in normal or starting position, the beveled teeth 41 thereon do not reach as far as the ratchet-wheel 42. The purpose of this construction is to permit the finger-pieces to be depressed to "0" without communicating motion to the adding-wheels. Unless the finger-pieces are depressed to "1" or beyond, the adding-wheels do not rotate at all.

Journaled in bearings 74 in the side-plates 57, and projecting beyond through the side, is a shaft 75, adapted to be rotated by a knob 76 attached thereto but located exterior to the casing. Idly revolving on this shaft are gear-wheels 77, which, while the adding operation is in progress, mesh with, and are driven by, gear-wheels 58. In the hub 78 of each of said wheels 77 is a notch 79. Secured to said shaft 75 are bosses 80, each boss pivotally supporting a spring-pressed pawl 81, said pawls being in alinement with each other. When the adding operation is in progress, and the adding-wheels 43 are rotated, the gears 58 cause the gears 77 to revolve idly in the direction indicated by arrow B, Fig. 11, but when it is desired to "clear" the machine, or return all the adding-wheels to "0", shaft 75 is rotated in the direction indicated by said arrow. As the shaft 75 is thus rotated, the pawls 81 one by one drop into the notches 79. This locks the heretofore idle gears 77 to the shaft 75, and causes them to rotate therewith, and, as these gears 77 mesh with the gears 58, the latter are, also, rotated, carrying with them the adding-wheels 43. After the adding operation has been completed, notches 77 will be variously positioned around the shaft 75, the position of each notch depending on the distance that the particular adding-wheel which rotates its gear 77 bearing said notch has been advanced, but, as the shaft 75 bearing the pawls 80 is rotated, said pawls will drop into the proper notches 79 wherever they may be, and each adding-wheel will be "picked up" and its rotation commenced as soon as the proper pawl drops into the notch 79 on the gear 77 opposite said adding-wheel. When, by the rotation of shaft 75, all the notches have been brought into alinement, and, in consequence, all the type 54 bearing the same numeral are, also, alining, the operator must stop the rotation of shaft 75 at the time when all of the type marked "0" are exposed to the ribbon 55, and the proper point at which to stop may be indicated by a suitable mark on the knob 76,

adapted to aline with another mark on the side-plate 1.

Mounted on a stud-like shaft 82, which projects from the side-plate 1, is the operating-lever 83, which is moved when it is desired to print the various numbers that are registered, or the sum thereof. Springs 84 and 85 have one end secured to a button 86 formed on the lower end of this lever, and their opposite ends are fastened by rivets 87 to the side-plate 1. When this lever is moved in either direction the contraction of the particular spring that has been expanded tends to return said lever to the normal position shown in Fig. 1. Brackets 88, projecting from side-plates 1, have screw-threaded openings in which are placed thumb-screws 89. These screws lie in the arc through which the operating lever 83 travels, and limit the movement thereof, and, obviously, by turning these screws one way or the other, the limit to which the operating-lever may be moved, can be regulated to whatever extent may be made necessary in the adjustment of the parts of each individual machine. Nuts 90 may then be tightened to hold the screws in fixed position.

Encircling the stud-like shaft 82, and secured to lever 83 by means of screws 91, is a gear-wheel 92, which rotates as the lever is moved. This gear meshes with and drives gear-wheel 93, which is secured to a stud-like shaft 94, journaled in a suitable perforation provided therefor in side-plate 1. Formed integral with shaft 94 is a rocker-arm 95, and on the opposite side of the machine is a similar rocker-arm 96, pivotally mounted, by means of stud 97, in the opposite side-plate 1. Depending from each rocker-arm is a flat stud 98, which studs are inserted in slots 99 formed in the ends of rod 100, said rod thus serving to cross-connect the two rocker-arms 95 and 96, thereby causing them to move in unison. Consequently, when the rotation of gear 93 causes shaft 94 to revolve, the rocker-arms 95 and 96 rotate in unison about studs 94 and 97 as an axis, the direction of such rotation being determined by the direction in which the operating-lever 83 is moved. This same result can, of course, be secured by mounting both rocker-arms on one shaft which extends from side to side of the machine, and this modification is sometimes used.

Journaled in perforations 101 in the rocker-arms is a shaft 102 to which is secured the platen-roller 103, which carries the paper ribbon 104 on which the numbers are printed. Fixed on said shaft is a ratchet-wheel 105, by means of which the platen-roller is given a partial revolution at each operation of the lever 83, and the paper ribbon 104, on which the items are to be printed, is thus advanced to leave sufficient space between the different lines. Two shafts 106 and 107 are, also, journaled in the rocker-arms, said shafts supporting friction-rollers 108 and 109 which bear against the platen-roller 103 and keep the paper ribbon 104 stretched taut. The paper reel 110 is supported on a core 111 which rests in sockets or slots 112 provided therefor in the side-plates 1, and, as the ribbon 104 leaves the reel, it passes between friction-roller 108 and the platen-roller, thence around the platen, being held thereagainst by the other friction roller 109, and emerges through the space between the two rollers 108 and 109, from whence it can be removed at the operator's convenience whenever the desired addition and imprint have been completed.

A bifurcated pawl 113, the two arms 114 and 115 of which are spaced apart a sufficient distance to permit the rocker-arm 95 to pass therebetween, is provided at one end with a sleeve 116, by means of which and a screw 117 passing therethrough and fitting into a tap-hole (not shown) provided therefor, said spring is mounted upon the side-plate 1. If desirable, however, the pawl 113 may be mounted in any other convenient manner. The pawl is so arranged that its short arm 114 lies in the path of travel of the ratchet-wheel 105, and, as the rocker-arms 95 and 96 are swung toward the left, Fig. 2, arm 115, which is, in reality, a spring pawl, engages the teeth of ratchet 105 and causes said ratchet to rotate, together with the platen-roller 103, both of which members are fixed to the same shaft 102. This operation secures the step-by-step forward feed of the paper ribbon which it is necessary to provide, in order to have each number printed on a separate line. In the other arm, 114, is a recess 118, and a pin 119, projecting from rocker-arm 95, is seated therein when the parts are in the normal position depicted in Figs. 2 and 4. When the platen is moved out of this position, the pin 119, riding out of said recess, slightly elevates arm 114, and, in consequence, arm or pawl 115 is, also, raised, and lifted out of engagement with ratchet 105, the parts being so proportioned that pawl 115 is thus lifted when the ratchet has been advanced the distance of one notch. The spring-arm 114, by bearing down on pin 119, tends to keep the platen locked in normal position after the springs 84 and 85 have returned the various parts thereto, and thereby prevents an unpleasant vibration that might occur if no means but the springs 84 and 85 were provided for holding the parts at rest. It will thus be seen that, as the operator, grasping the handle 120, moves the lever 83 toward the right, Fig. 1, gear-wheel 92 rotates gear 93, thereby causing the revolution of shaft 94, and, consequently, the rocking of arms 95 and 96, and the rollers carried thereby.

The arms continue thus to move until the platen 103 strikes the type 34, the ribbon 35 feeding between said type and said platen, which type, by operation of the finger-pieces 12, have been raised into place. As the platen strikes these type, the numbers they bear are printed on the paper-ribbon 104, after which the lever 83 is released, and the spring 84 returns the lever and platen to normal position. When the operator desires to obtain and print the sum of the various items that have been added by the machine, the operating-lever 83 is moved toward the left, Fig. 1, thereby causing the platen 103 to descend and impinge against the ribbon 55 and the type-faces 54 of the adding-wheels 43 which are exposed thereto.

The screws 89 are so set that the operating-lever 83 strikes thereupon simultaneously with the striking of platen 103 on the type, thus permitting the major part of the percussion to be borne by the lever and screws rather than by the platen and type, thereby helping to reduce the wear and tear on the more delicate parts of the mechanism.

The ribbons 35 and 55 are carried on reels 121, which are rotatably mounted in suitable brackets 122 projecting from and exterior to the side-plates 1. The ribbons may be fed forward by manual operation of the knurled knobs 123, which are secured to each reel, or by suitable automatic ribbon-feed mechanism, which, forming no part of the present invention, is not herein described in detail. The ribbons pass into the interior of the machine through slots 124 provided therefor in the side-plates 1.

It will be seen that the accumulating mechanism is all carried between the side-plates 57, and is entirely independent of the printing mechanism. Brackets 125 are fastened to these side-plates, and secured thereto are rods 5, the construction of which is herein above described. If it should, at any time, become necessary to make repairs on the accumulating mechanism, it may be removed *in toto* without disturbing the residue of the machine. The only members intermediate the accumulating mechanism and the sectors 8 are the rack-bars 38, and these are constructed with their right-hand ends, Fig. 3, of such size that they may be inserted in place underneath the adding-wheels, or removed therefrom, with little difficulty. These rack-bars are grooved at 126, and the rollers 39 and 47 ride in these grooves, thereby preventing any side-swaying of the rack-bars as they travel.

In the adjustment of parts, it will, of course, be necessary to have the adding-wheels 43 alining with the type 34, so that the figures to be printed by the adding-wheels will be in the same columns as those of the corresponding denominations printed by the type 34. Ratchet 42 and the teeth 36 on the sector 8 are, therefore, not in alinement, and the teeth 41 on the rack-bars 38 are set to one side, as shown in Fig. 3, rather than along the center of the bar. These teeth, accordingly, will not strike the type 34 on the sectors 8 when the parts are returned to starting position, but will be to one side, as in Fig. 2. The rack-bars have a cut-away part 127 which gives the adding-wheels 43 sufficient space in which to revolve.

The side-plates 57, which support the accumulating mechanism, are bound together by the shafts 49 and 56, by rods 128 and 129, which rods, also, support the springs 51 and by other rods 130, and thus the accumulating mechanism is grouped by itself, in a frame comprised of the side-plates 57 and various cross-connecting rods.

In many adding-machines, there is an undesirable profusion of parts cross-connecting the different sections, making such machines expensive, complex in construction, and difficult to assemble, but in the present invention the listing mechanism, accumulating mechanism, and mechanism supporting and actuating the platen are all grouped independently of each other, save for the rack-bars 38 which connect the listing to the accumulating mechanism. Thus, each section of the machine can be separately assembled and placed in position, and, after that is done, and the simple operation of adjusting the rack-bar is performed, the machine will be ready for use. The rack-bars give a positive motion to the adding-wheels, while in nearly all other machines the adding mechanism is spring-actuated, which, of course, makes successful and accurate operation more difficult to secure.

The operation of the machine, in so far as it has not already been described, is as follows: the particular digit of each denomination to be added is determined by the extent to which the proper finger-piece 12 is depressed, and the extent of such depression depends, in turn, upon the particular socket 17 of said finger-piece in which the finger of the operator is placed. As fast as each finger-piece 12 is depressed to the limit permitted with the finger placed in any particular socket, and the sector 8 to which it is secured thereby rotated, one of the pawls 21 locks the sector and attached parts against return movement. By the rotation of the sector, the type 34 carried thereon are raised until the proper type-face is at a point opposite the ribbon 35, and, simultaneously therewith, the rack-bar 38 engaging said sector is driven forward, said bar in turn causing the proper adding-wheel 43 to rotate the distance necessary to make the type 54 which is then left exposed to the ribbon 55 represent the sum of the number at which the adding-wheel last stood and the new digit that has been added in. When all the necessary

finger-pieces have been depressed, it is obvious that the proper type 34 which will then be in a position opposite the ribbon 35, will represent the desired number, which number may then be printed. To print the numbers, the operator moves lever 83 to the right, Fig. 1, thus causing the platen 103 to move and strike the type 34, which thereupon print their respective figures on the paper carried by the platen. The number having been printed, the lever is released, spring 84 acts thereupon and returns it, together with the platen, to normal position, where the platen mechanism is locked against vibration by the bearing of spring 114 upon pin 119. Knob 20 is then turned in the direction of the arrow, Fig. 1, the pawls 21 are thereby withdrawn from engagement with the finger-pieces 12, and springs 24 cause the sectors 8 and connected parts to fly back to the starting position. The return movement of the rack-bars 38 will not, however, affect the adding-wheels 43, as pawls 44 lock these against return movement. These operations may be repeated *ad libitum*, so long as there are any numbers to be printed and added, and at each operation of the operating-lever 83 the platen is given a partial revolution by the action of pawl 115 on ratchet 105, to feed the paper ribbon forward. Finally, when all the numbers to be added have been thus registered and printed, the operating lever is pulled toward the left, Fig. 1, thereby bringing the platen 103 into engagement with the type 54 of the adding-wheels 43, which print the sum or total of the column of items upon the paper ribbon 104. Knob 76 may, thereupon, be turned, and the machine "cleared."

In cases where it may be desired merely to ascertain the sum of certain numbers, without printing or listing them, the various numbers may be registered in the usual manner, but the operations of the lever 83 omitted, except, possibly, the final one, which causes the sum itself to be printed. Subtotals may be obtained at any desired intermediate point, and the adding operation thereupon resumed, because the machine is not "cleared" by the mere printing of a total, since the "clearing" requires the independent and distinct operation hereinbefore described.

Having thus described my said invention, what I claim and desire to secure by Letters-Patent is:

1. An adding machine, comprising in combination, a plurality of rotatable sector shaped listing means, selective finger-pieces concentrically rigid with said listing means, means engaging said finger pieces for locking said listing means when rotated, accumulating mechanism, means for actuating said accumulating mechanism, and means for returning said listing means to normal position, while leaving said accumulating mechanism in a position of continuous total.

2. An adding machine, comprising in combination, a rotatable listing mechanism, a registering mechanism having an arcual movement therewith, accumulating mechanism actuated by said registering mechanism, and an independently actuated platen cooperated either with said listing mechanism or said accumulating mechanism.

3. In an adding-machine, the combination of a plurality of sectors, a corresponding plurality of adding-wheels, and a corresponding plurality of rack-bars actuating said adding-wheels, said sectors actuating said rack-bars.

4. In an adding-machine, the combination of a plurality of listing-sectors, a corresponding plurality of adding-wheels, a ratchet-wheel secured to each adding-wheel, a plurality of reciprocating rack-bars actuated by said sectors and meshing with said ratchets and rotating the same, and spring-controlled rollers keeping said rack-bars in engagement with their respective ratchets during motion in one direction, said rollers being depressible when said rack-bars move in the reverse direction.

5. In an adding-machine, the combination of a plurality of sectors, finger-pieces attached thereto and causing rotation of same, a corresponding plurality of adding-wheels, a ratchet wheel secured to each adding-wheel, a plurality of reciprocating rack-bars actuated by said sectors and meshing with said ratchets and rotating the same, and spring-controlled rollers keeping said rack-bars in engagement with said ratchets as said rack-bars move in one direction, said rollers being depressible when said rack-bars move in the reverse direction.

6. In an adding-machine, the combination of a plurality of listing sectors, a corresponding plurality of adding-wheels, a ratchet-wheel secured to each adding-wheel, and a reciprocating rack-bar actuated by a sector and meshing with said ratchet and adapted on moving in one direction to rotate the same, said adding-wheels being locked against movement when said rack-bars travel in the return direction.

7. In an adding-machine, the combination of means for listing the individual items and self-contained means for accumulating and printing the total thereof, with platen mechanism, said platen mechanism consisting of a roller, rocker-arms in which said roller is journaled, and means for rocking said arms.

8. In an adding-machine, the combination of means for listing the individual items and self-contained means for accumulating and printing the total thereof, including platen mechanism, said mechanism consisting of a pair of pivotally-mounted rocker-

arms, a platen roller journaled in said rocker-arms, means cross-connecting said rocker-arms to cause them to swing in unison, and means for moving said arms.

9. In an adding-machine, the combination of means for listing the individual items and means for accumulating and printing the total thereof, including platen mechanism suspended and oscillative between said listing means and said accumulating means, said platen mechanism consisting of a pair of rocker-arms, a platen roller journaled in said arms, and means for moving said arms so that said roller impinges either on said listing-means, or on said accumulating means.

10. In an adding machine, the combination of means for listing the individual items and separate means for accumulating and printing the total thereof with platen mechanism suspended for arcual movement to be operative on either said listing means or said accumulating means, said platen mechanism consisting of a pair of rocker-arms, a platen roller journaled in said arms, means for moving said arms so that said roller impinges against said listing means, and means for causing a partial revolution of said roller at each of said operations.

11. In an adding-machine, the combination of a unitary means for registering and listing the individual items, other self-contained means for accumulating and printing the total thereof, means for setting up the desired numbers in said listing and said accumulating sections, and means for printing the items and totals when so set up.

12. In an adding-machine, the combination of rotating means for registering the individual items, means for listing the same, and means for accumulating and printing the same, the particular numerals of said listing and said accumulating means that are brought to operative position being determined by the extent of movement given said registering means.

13. In an adding-machine, the combination of a plurality of sectors, listing-type on each sector, a rack-bar driven by each sector, and an adding-wheel rotated by said rack-bar.

14. In an adding-machine, the combination of a plurality of sectors, each sector controlling one column of figures, means on each sector for printing the figures in said column, means actuated by said sectors for accumulating the total of all the numbers that have been added, and means for printing the proper figures representing said total.

15. In an adding-machine, the combination of a plurality of rotatably-mounted sectors, a finger-piece attached to each sector by means of which said sector is operated, sockets in each of said finger-pieces, pawls adapted to seat in said sockets when the finger-pieces are depressed, thereby to lock said sectors against return movement, and means for withdrawing all of said pawls in unison.

16. In an adding-machine, the combination of a plurality of rotatably-mounted sectors, finger-pieces attached to each sector by means of which said sectors are operated, sockets in each of said finger-pieces, a shaft, pawls upon said shaft adapted to seat in said sockets when the finger-pieces are depressed, bosses on said shaft, and pins fixed to said bosses and projecting therefrom, said pins being adapted, upon rotation of the shaft, to engage said pawls and force them out of said sockets.

17. In an adding-machine, the combination of a plurality of adding-wheels, a ratchet-wheel secured to each adding-wheel, means engaging each ratchet to rotate its adding-wheel in one direction, other means engaging said ratchet to lock said adding-wheel against return movement, and means opposite said ratchet to clear said adding-wheels.

18. In an adding-machine, the combination of a plurality of sectors, an adding-wheel actuated by each sector, a rack-bar intermediate each sector and the corresponding adding-wheel, the rotation of said sector producing rotation of its adding-wheel, and a depressible roller supporting said rack-bar and keeping the same in engagement with said adding-wheel.

19. In an adding-machine, the combination of a platen, a shaft on which said platen is mounted, a pair of rocker-arms in which said shaft is journaled, a ratchet wheel on said shaft, a pawl placed in the path of travel of said ratchet and causing a partial rotation thereof at each movement of the rocker-arms, and means for predeterminedly releasing said pawl from engagement with said ratchet.

20. In an adding-machine, the combination of a platen, a shaft on which said platen is mounted, a pair of rocker-arms in which said shaft is journaled, a ratchet-wheel on said shaft, a pawl placed in the path of travel of said ratchet and causing a partial rotation thereof on movement of the rocker-arms, and a member integral with said pawl for predeterminedly releasing said pawl from engagement with said ratchet.

21. In an adding-machine, the combination of listing-means and registering means both secured to a common member, accumulating-means actuated by said common member, a paper ribbon, and means for bringing said paper ribbon into contact with said listing-means and said accumulating means.

22. In an adding-machine, the combination of adding-wheels, rack-bars rotating the

same, rotating sectors driving said rack-bars, a groove in each of said rack-bars and rollers in said grooves to guide and support said rack-bars.

23. In an adding-machine, the combination of a platen, a shaft on which said platen is mounted, a pair of rock-arms in which said shaft is journaled, a ratchet-wheel fixed on said shaft, and means interposed in the path of travel of said ratchet adapted to cause a partial revolution of said ratchet at each movement of said platen, said means being automatically and predeterminedly removed from engagement with said ratchet.

24. In an adding-machine, the combination of a platen, a shaft upon which said platen is mounted, a pair of rocker-arms in which said shaft is journaled, a ratchet-wheel fixed on said shaft, a pawl placed in the path of travel of said ratchet and adapted to cause a partial revolution of the same, and means upon one of said rocker-arms adapted to move said pawl out of engagement with said ratchet.

25. In an adding-machine, the combination of a platen, a shaft upon which said platen is mounted, a pair of rocker-arms in which said shaft is journaled, studs depending from said rocker-arms, and a rod having slots into which said studs are inserted, said rod cross-connecting said rocker-arms.

26. In an adding-machine, the combination of mechanism for printing the different items, separate mechanism for accumulating and printing the total thereof, and registering mechanism simultaneously and positively actuating said first-mentioned and said second-mentioned groups of mechanism.

27. In an adding-machine, the combination of a group of parts adapted to list the numbers, and a separate group of parts adapted to accumulate and print the totals thereof, said groups being independently removable as groups from the machine.

28. In an adding-machine, the combination of a group of parts adapted to register and list the numbers, and a separate group of parts adapted to accumulate and print the totals thereof, said groups being independently removable as groups from the machine.

29. In an adding-machine, the combination of a group of parts adapted to list the numbers, a group of parts adapted to accumulate and print the totals thereof, and a group of parts adapted to bring a paper ribbon on which to imprint the figures into contact with said first-mentioned and said second-mentioned groups, all of said groups being independently removable as groups from the machine.

30. In an adding-machine, the combination of a group of parts adapted to register and print the numbers, a group of parts adapted to accumulate and print the totals thereof, said groups of parts being independently removable as groups, and members cross-connecting said groups.

31. In an adding-machine, the combination of a group of parts adapted to register and print the numbers, and a group of parts adapted to accumulate and print the totals thereof, supports for all of said parts, said groups being mounted in the machine upon separate supporting-members.

32. In an adding-machine, the combination of a group of parts adapted to register and print the numbers, a group of parts adapted to accumulate and print the totals thereof, and a group of parts adapted to bring an impression-receiving means into contact with said other-mentioned parts, all of said parts being mounted upon separate supporting-members.

33. In an adding-machine, the combination of a group of parts adapted to register and print the numbers, and a group of parts adapted to accumulate and print the totals thereof, said groups being adapted to be simultaneously actuated by movement of a suitable member, but said groups being, also, independently removable from the machine.

34. In an adding-machine, the combination of a group of parts adapted to register and print the numbers, a group of parts adapted to accumulate and print the total thereof, and a group of parts cross-connecting said groups whereby the actuation of said registering means causes actuation of said accumulating means, all of said groups being independently removable as groups from the machine.

35. In an adding-machine, the combination of a group of parts adapted to register and print the numbers, a group of parts adapted to accumulate and print the total thereof, and a group of parts by means of which the actuation of said registering parts causes actuation of said accumulating parts, said last-mentioned parts being removable from engagement with said other-mentioned parts.

36. In an adding-machine, the combination of a group of parts adapted to register and print the numbers, a group of parts adapted to accumulate and print the total thereof, and a group of parts adapted to bring an impression receiving means into contact with said other-mentioned groups, all of said groups being independently removable as groups, said first-mentioned and said second-mentioned groups being simultaneously actuated by a common member, but said last-mentioned group being actuated by a separate member.

37. In an adding machine, the combination of three separately-removable groups of parts, one for registering the numbers to be

added, another for accumulating and printing the totals thereof, and a third for imprinting the figures, all of said parts being independently removable as groups from the machine.

38. In an adding-machine, the combination of mechanism for listing the items, mechanism for accumulating the total thereof, and a platen which, when moved in one direction, engages said listing mechanism, and when in another direction, engages said accumulating mechanism.

39. In an adding-machine, the combination of means for listing the items, means for accumulating the total thereof, a platen hung therebetween which is brought into engagement at different times with said listing means and with said accumulating means, and a rocking frame in which said platen is carried, separate supporting means being provided for said listing means and for said adding means.

40. In an adding-machine, the combination of means for listing the items, independent, self-contained means for accumulating the totals thereof, a platen which is brought into engagement at different times with said listing means and with said accumulating means, and means for rotating said platen.

41. In an adding-machine, the combination of means for listing the items, self-contained means for accumulating the total thereof, a platen supported therebetween which is brought into engagement at will with said listing means and with said accumulating means, and means for causing a partial rotation of said platen at each engagement with said printing means.

42. In an adding-machine, the combination of sectors comprising a means for listing the items, a series of adding-wheels independently mounted for accumulating the total thereof, a platen which is brought into engagement with either said sectors or said adding-wheels, said adding-wheels being actuated by said sectors but said platen being actuated at will.

43. In an adding-machine, the combination of sectors having listing type thereupon, a self-contained series of adding-wheels for accumulating and printing the totals, a platen which is brought into engagement at different times with said listing type and with said adding-wheels, means for rotating said sectors, means whereby the rotation of said sectors causes rotation of the adding-wheels, and other means for moving the platen.

44. In an adding-machine, the combination of sectors having listing type thereupon, adding-wheels for accumulating and printing the totals, a platen which is brought into engagement at different times with said listing type and with said adding-wheels, finger-pieces secured to said sectors and causing the rotation of same, means whereby the rotation of said sectors causes rotation of the adding-wheels, and other means for moving the platen.

45. In an adding-machine, the combination of means for listing and printing the items, means for accumulating and printing the total thereof, a platen which is brought into engagement at different times with said listing means and with said accumulating means, and means for holding said platen between said aforementioned means.

46. In an adding-machine, the combination of means for listing and printing the items, means for accumulating and printing the total thereof, the printing type carried by one of said means facing approximately at right angles to the type carried by said other means, and a platen disposed between the two means.

47. In an adding-machine, the combination of means for listing and printing the items, means for accumulating and printing the total thereof, the printing type carried by one of said means facing approximately at right angles to the printing type carried by said other means, a platen normally disposed between said two means, and means for bringing said platen into engagement with said listing and said accumulating means.

48. In an adding-machine, the combination of sectors for listing and printing the items, adding-wheels for accumulating and printing the total thereof, the type from which the items are listed facing approximately at right angles to the total-printing type, a platen normally disposed between the sectors and the adding-wheels, and means for bringing said platen into engagement with said sectors and with said adding-wheels.

49. In an adding-machine, the combination of sectors for listing and printing the items, adding-wheels for accumulating and printing the total thereof, the type from which the items are listed facing approximately at right angles to the total-printing type, finger-pieces for actuating said sectors and adding-wheels, a platen, and means for bringing said platen into engagement with said sectors and with said adding-wheels.

50. In an adding-machine, the combination of sectors for listing and printing the items, adding-wheels for accumulating and printing the total thereof, the type from which the items are listed facing approximately at right angles to the total-printing type, finger-pieces secured to the sectors for rotating same, means by which rotation of the sectors causes rotation of the adding-wheels, a platen, and means for bringing said platen into engagement with said sectors and with said adding-wheels.

51. In an adding-machine, the combina-

tion of sectors for listing and printing the items, adding-wheels for accumulating and printing the total thereof, the type from which the items are listed facing approximately at right angles to the total-printing type, a platen, a rocking frame for bringing said platen into engagement with said sectors and with said adding-wheels, and means for rocking said frame.

52. In an adding-machine, the combination of sectors for listing and printing the items, adding-wheels for accumulating and printing the total thereof, the listing type facing approximately at right angles to the total-printing type, finger-pieces for rotating the sectors and adding-wheels, a platen, and a lever for bringing said platen into engagement with said sectors and with said adding-wheels.

53. In an adding-machine, the combination of sectors for listing and printing the items, adding-wheels for accumulating and printing the total thereof, the type from which the items are listed facing approximately at right angles to the total-printing type, finger-pieces secured to the sectors for rotating same, means intermediate the sectors and the adding-wheels whereby rotation of the former secures rotation of the latter, a platen, and a lever for bringing said platen into engagement with said sectors and with said adding-wheels.

54. In an adding-machine, the combination of sectors for listing and printing the items, adding-wheels for accumulating and printing the total thereof, listing type on the periphery of the sectors, gear teeth also on the periphery thereof, and rack-bars rotating the adding-wheels, said rack-bars meshing with and being driven by said teeth upon said sectors.

55. In an adding-machine, the combination of sectors, adding-wheels for accumulating the totals, gear teeth upon the periphery of the sectors, and rack-bars in constant mesh with said gear teeth but in intermittent mesh with said adding-wheels.

56. In an adding-machine, the combination of sectors for registering the items, adding-wheels for accumulating the total thereof, gear teeth upon the periphery of the sectors, ratchet-means upon the adding-wheels, and rack-bars engaging said sector teeth and said ratchet-means, said rack-bars moving in both directions in mesh with said sector teeth and in one direction only in mesh with said ratchet-means.

57. In an adding-machine, the combination of sectors for registering the items, adding-wheels for accumulating the total thereof, and rack-bars engaging said sectors and said adding-wheels and having gear teeth at the ends engaging said sectors and beveled teeth at the ends engaging said adding-wheels.

58. In an adding-machine, the combination of sectors for registering the items, adding-wheels for accumulating the total thereof, gear teeth upon the periphery of the sectors, ratchet-means upon the adding-wheels, and rack-bars having gear teeth at one end meshing with the teeth upon said sectors, and beveled teeth upon the other end engaging said ratchet-means.

59. In an adding-machine, the combination of sectors for registering the items, adding-wheels for accumulating the total thereof, rack-bars actuated by said sectors and actuating said adding-wheels, said rack-bars returning to a starting position with said sectors while leaving said accumulating mechanism in the position to which it may have been advanced.

60. In an adding-machine the combination of sectors for registering the items, adding-wheels for accumulating the totals thereof, rack-bars actuated by said sectors and actuating said adding-wheels, a fixed member beneath said rack-bars adjacent the point of engagement with the sectors, and a depressible member beneath said rack-bar adjacent the point of engagement with said adding-wheels.

61. In an adding-machine, the combination of sectors for registering the items, adding-wheels for accumulating the total thereof, rack-bars actuated by said sectors and actuating said adding-wheels, and supports for each of said rack-bars, one of said supports being yielding, the other unyielding.

62. In an adding-machine, the combination of sectors for registering the items, adding-wheels for accumulating the total thereof, rack-bars actuated by said sectors and actuating said adding-wheels, a yielding supporting and guiding-means beneath each rack-bar adjacent its point of contact with its adding-wheel, and a fixed support adjacent its point of engagement with the sector.

63. In an adding-machine, the combination of sectors for registering the items, adding-wheels for accumulating the total thereof, rack-bars actuated by said sectors and actuating said adding-wheels, and means engaging said rack-bars and said adding-wheels by which said bars are returned to starting position leaving said adding-wheels in the position to which they may have been advanced.

64. In an adding-machine, the combination of a platen, a shaft on which said platen is mounted, rocker-arms in which said shaft is journaled, a ratchet-wheel upon said shaft, means interposed in the path of travel of said ratchet to cause a partial rotation of said platen on movement of said rocker-arms, and means secured to said last-mentioned means and predeterminedly disengaging same from said ratchet.

65. In an adding-machine, the combination of a platen, a shaft on which said platen is mounted, rocker-arms in which said shaft is journaled, a ratchet wheel upon said shaft, a bifurcated member between the arms of which one of said rocker-arms passes, one of said arms causing a partial rotation of the platen at each movement of the rocker-arms, the other arm serving predeterminedly to release said first-mentioned arm from engagement with the ratchet.

66. In an adding-machine, the combination of a platen, a pair of rocker-arms in which said platen is mounted, a lever to rock said arms and a pair of rollers mounted in said arms and bearing on said platen.

67. In an adding-machine, the combination of a platen, a pair of rocker-arms in which said platen is mounted, a lever by which said rocker-arms are rocked, and stops placed in the path of travel of the lever to limit the movement thereof.

68. In an adding-machine, the combination of mechanism for registering and listing the items, mechanism for accumulating and printing the totals thereof, a rotary platen and means for bringing the platen into engagement with the listing mechanism and then with the accumulating mechanism.

69. In an adding-machine, the combination of a casing, a pair of side plates, accumulating mechanism supported by said side-plates, and means for supporting said side-plates from said casing.

70. In an adding-machine, the combination of a casing, registering and listing mechanism supported by the casing, a supplemental casing, and accumulating mechanism supported in said supplemental casing, said supplemental casing being supported by said first-mentioned casing.

71. In an adding-machine, the combination of a casing, registering and listing mechanism carried upon rods supported by said casing, a supplemental casing, and accumulating mechanism supported within said supplemental casing, said last-mentioned casing being supported within said first-mentioned casing.

72. In an adding-machine, the combination of a casing, registering and listing mechanism carried upon rods supported by said casing, a supplemental casing, and accumulating mechanism supported within said supplemental casing, said last-mentioned casing being supported with said first-mentioned casing, said registering mechanism and said accumulating mechanism being independently removable from the machine.

73. In an adding-machine, the combination of a plurality of sectors approximately circular in shape, means for rotating same, and a plurality of adding-wheels, a plurality of rack-bars intermediate the circular parts of the sectors and the adding-wheels, said rack-bars being in constant mesh with said sectors but in ratchet mesh with said adding-wheels.

74. In an adding-machine, the combination of a plurality of sectors approximately circular in shape, means for rotating same, teeth upon said circular parts of said sectors, toothed rack-bars meshing with said sector-teeth, and adding-wheels actuated by said rack-bars.

75. In an adding-machine, the combination of a plurality of sectors approximately circular in shape, means for rotating same, teeth upon the circular parts of said sectors, a plurality of adding-wheels, ratchets in connection with said adding-wheels, rack-bars having teeth which teeth remain in constant mesh with the teeth upon said sectors, and having other teeth which engage said ratchets and rotate same when the rack-bars are forced in one direction, but which ride over said ratchets as the rack-bars move in the opposite direction.

76. In an adding-machine, the combination of a plurality of sectors approximately circular in shape, a plurality of adding-wheels, listing type carried in one of the lower quadrants of each sector, the other lower quadrant being toothed, and toothed means meshing with said sector-teeth and driven by said sector, said means rotating said adding-wheels.

77. In an adding-machine, the combination of means for listing and printing the items, self-contained means for accumulating and printing the totals thereof, a platen supported therebetween, and rocking means for causing said platen to strike said listing means or said accumulating means, separate supporting means being provided for said listing means and for said adding means.

78. In an adding-machine, the combination of means for listing the items, means for accumulating and printing the totals thereof, a platen, a lever to carry the platen into engagement with said aforementioned means, and stops in the path of travel of said lever to limit the movement thereof.

79. In an adding-machine, the combination of means for listing the items, means for accumulating and printing the totals thereof, a platen, a lever, side-plates supporting all of said aforementioned members, and stops secured to said side-plates and disposed in the path of movement of said lever, thereby to limit said movement.

80. In an adding-machine, the combination of a plurality of sectors for listing the items, adding-wheels for accumulating the totals thereof, rack-bars actuated by said sectors and actuating said adding-wheels, each rack-bar having a cut away portion to receive its adding-wheel and a fixed member

riding in said cut-away portion and preventing undue pressure of said rack-bar on the adding-wheel actuated thereby.

81. In an adding-machine, the combination of a plurality of sectors for listing the items, adding-wheels for accumulating the totals thereof, rack-bars actuated by said sectors and actuating said adding-wheels, each rack-bar having a cut-away portion to receive its adding-wheel, a fixed member riding in said cut-away portion, and a depressible member to hold said rack-bar against the adding-wheel actuated thereby.

82. In an adding-machine, the combination of a casing, a plurality of sectors, a shaft supporting same, a plurality of adding-wheels, and a shaft supporting same, one of said shafts projecting through the casing but the other being entirely within the casing.

83. In an adding-machine, the combination of mechanism for listing and printing the items, mechanism for accumulating and printing the total thereof, a platen normally retained between the two, and means for bringing said platen into engagement with said listing means or with said accumulating means.

84. In an adding-machine, the combination of sectors comprising a means for listing the items, adding-wheels, for accumulating and printing the total thereof, each sector and its corresponding adding-wheel being in the same plane, and a platen supported therebetween and rocking in said plane and engaging at will said listing means and said accumulating means, separate supporting means being provided for said listing means and for said adding means.

85. In an adding-machine, the combination of means for listing the items, means for accumulating and printing the total thereof, a platen roller supported therebetween, and means for bringing said roller into engagement with said listing means, and also, with said accumulating means.

86. In an adding-machine, the combination of listing means, accumulating means, a platen suspended therebetween and having an arcual movement in a path intersecting said listing means and said accumulating means, means to carry said platen into engagement with said listing means and with said accumulating means, and means for rotating at will said platen while it is being so carried.

87. In an adding-machine, the combination of means for listing and printing the items, means for accumulating and printing the totals thereof, the type from which the items are printed facing approximately at right angles to the total-printing type, and means to bring a paper ribbon into engagement with said total-printers and with said list-printers.

88. In an adding-machine, the combination of means for listing and printing the items, means for accumulating and printing the totals thereof, the type from which the items are printed facing approximately at right angles to the total-printing type, a platen, and means for bringing said platen into engagement with said list-printers and with said total-printers.

89. In an adding-machine, the combination of means for listing and printing the items, means for accumulating and printing the totals thereof, the type from which the items are printed facing approximately at right angles to the total-printing type, means for actuating simultaneously said list-printers and said total-printers, a platen, and means for bringing said platen into engagement with said list-printers and with said total-printers.

90. An adding-machine having a plurality of sectors, listing type thereupon, a socketed finger-piece secured to each sector at a point opposite the listing type, and downwardly-depending pawls adapted to seat in said sockets, thereby to lock the sectors in position.

91. An adding-machine having a plurality of sectors, listing type thereupon, a socketed finger-piece secured to each sector at a point opposite the listing type, pawls adapted to seat in said sockets, thereby to lock the sectors in position, springs to keep said pawls normally pressed against said finger-pieces, and a cross-rod to support said springs.

92. In an adding machine, the combination of listing means, accumulating mechanism actuated thereby, a platen suspended to have an arcual movement therebetween, and means for carrying said platen into engagement with said listing means and with said accumulating mechanism.

93. In an adding-machine, the combination of a plurality of rotatably-mounted type-bearing sectors, finger-pieces attached thereto by means of which said sectors are rotated, means for locking each sector in the position to which it may have been rotated, and means for releasing all the sectors in the series simultaneously, thereby permitting the return thereof.

94. An adding-machine having a plurality of sectors, listing means upon each sector, socketed finger-pieces secured to each sector, pawls adapted to seat in said sockets for locking said sectors in place, and means for simultaneously withdrawing all of said pawls.

95. In an adding-machine, the combination of means for listing the items, means alining therewith for accumulating and

printing the total thereof, a platen which is brought into engagement at different times with said printing means and said accumulating means, and a lever to carry said platen into and out of such engagement.

96. In an adding-machine, the combination of means for listing the items, means for accumulating and printing the totals thereof, finger-pieces for operating said afore-mentioned means, a platen which is brought into engagement at different times with said listing means and with said accumulating means, and a lever for actuating said platen.

97. In an adding-machine, the combination of listing means, accumulating means, a platen operative therebetween, and a lever by which the said platen is caused to engage said listing means and said accumulating means, separate supporting means being provided for said listing means and for said adding means.

98. In an adding-machine, the combination of means for listing and printing the items, means for accumulating and printing the totals thereof, a rockable platen operative therebetween, and a lever to rock said platen into engagement with said listing means and with said accumulating means, separate supporting means being provided for said listing means and for said adding means.

99. In an adding-machine, the combination of means for listing the items, means for accumulating and printing the total thereof, a single rockable platen operative between said listing means and said accumulating means and adapted simultaneously to engage all of said adding-wheels, and a lever to rock said platen into such engagement, separate supporting means being provided for said listing means and for said adding means.

100. In an adding-machine, the combination of means for listing the items, and means alining therewith for accumulating and printing the total thereof, and a single platen adapted to engage simultaneously all of said adding-means or all of said listing means, separate supporting means being provided for said listing means and for said adding means.

101. In an adding-machine, the combination of a plurality of sectors approximately circular in shape, an L-shaped finger-piece attached to each sector, listing type carried upon the circular part of said sector, and springs subject to the tension of which said sectors move.

102. In an adding-machine, the combination of a plurality of sectors approximately circular in shape, means for rotating same, listing-type carried upon the circular part of each sector, a plurality of adding-wheels, said adding-wheels being actuated by the circular part of said sectors, and springs subject to the tension of which said sectors move.

103. In an adding-machine, the combination of a plurality of sectors approximately circular in shape, means for rotating same, a plurality of adding-wheels, longitudinally-moving means intermediate said adding-wheels and the circular part of said sectors, whereby the rotation of said sectors actuates said adding-wheels, and springs subject to the tension of which said sectors move.

104. In an adding-machine, the combination of a plurality of sectors, a corresponding plurality of adding-wheels, a single member cross-connecting each sector to an adding-wheel, said member directly engaging both the sector and adder connected thereby, and springs subject to the tension of which said sectors move.

105. In an adding-machine, the combination of a plurality of sectors, means for rotating same, a corresponding plurality of adding-wheels, means intermediate each sector and its corresponding adding-wheel and actuated by the sector whereby said adding-wheel is rotated in the same direction as its sector, and springs subject to the tension of which said sectors move.

106. In an adding-machine, the combination of a plurality of sectors mounted with their centers in alinement and spaced relatively close together, finger-pieces attached to each sector and spaced relatively far apart, a plurality of adding-wheels in longitudinal registration with the sectors, means cross-connecting the sectors and the adding-wheels and in longitudinal registration therewith, and springs subject to the tension of which said sectors move.

107. In an adding-machine, the combination of a plurality of sectors mounted with their centers in alinement, listing type upon said sectors, means for rotating the sectors, a plurality of wheels for accumulating and printing the totals, said wheels having their centers in alinement, means intermediate said sectors and said accumulating-wheels, each sector, its corresponding accumulating-wheel, and the means cross-connecting same being in a common plane, and springs subject to the tension of which said sectors move.

108. In an adding-machine, the combination of a plurality of sectors mounted with their pivotal points in alinement, listing type upon said sectors, a finger-piece secured to each sector for rotating same, a plurality of wheels for accumulating and printing the totals, said wheel having their centers in alinement, means intermediate said sectors and said accumulating wheels, each sector, its corresponding accumulating-wheel, and the means cross-connecting same being in

the same plane, but the corresponding finger-piece being in a different plane, and springs subject to the tension of which said sectors move.

109. In an adding-machine, the combination of means for listing the items, means for accumulating and printing the total thereof, a platen, a lever to carry said platen into engagement with said aforementioned means, and stops to limit the movement of said platen.

110. In an adding-machine, the combination of means for listing the items, means for accumulating and printing the totals thereof, and a platen roller operative therebetween which, when carried in one position, engages said listing means, and when carried in another position, engages said accumulating means.

111. In an adding-machine, the combination of a plurality of members each bearing listing type, a plurality of adding-wheels, an integral platen, and means to oscillate said platen to carry it into engagement with all of said type-bearing members or all of said adding-wheels.

112. In an adding-machine, the combination of a plurality of members each bearing listing-type, a plurality of adding-wheels, a platen suspended for arcual movement to engage all of said type-bearing members and all of said adding-wheels, and means to carry said platen into or out of such engagement.

113. In an adding-machine, the combination of listing means and registering means, both secured to a common member, accumulating means, and a platen which, when in one position engages said listing means and when in another position engages said accumulating means.

114. In an adding-machine, the combination of listing means and registering means, both secured to a common member, accumulating means actuated thereby, and a platen, which, when in one position engages said listing means and when in another position engages said accumulating means.

115. In an adding-machine, the combination of listing means and registering keys, both rotatable upon a common shaft, accumulating means, and a platen which when in one position engages said listing means and when in another position engages said accumulating means.

116. In an adding-machine, the combination of means for bearing and advancing the type which print the items, accumulating mechanism actuated by the type-bearing means, a platen, and means for rocking said platen into engagement with said item-printing mechanism and with said accumulating mechanism.

117. In an adding-machine, the combination of a plurality of sectors approximately circular in shape, means for rotating same, a plurality of adding-wheels, rack-bars actuated by the sectors thereby to actuate the adding-wheels, ratchets in connection with said adding-wheels, and teeth upon said rack-bars which teeth mesh with said ratchets, each rack-bar being provided with a cut-away portion to receive the appropriate adding-wheel.

118. In an adding-machine, the combination of type for listing the items, means for advancing said listing type, means for accumulating the totals, separate supporting means being provided for said listing means and for said accumulating means, said accumulating means being actuated by said listing type advancing means, and a platen independently actuated, said platen being brought into engagement at different times with the item printers and with the accumulating means.

119. In an adding-machine, the combination of means for listing the items, means for accumulating and printing the total thereof, a platen, a member supporting same, a pivot for said member, a lever, and means actuated by the lever for rotating said pivot, thereby to move the platen into engagement with said listing means or with said accumulating means.

120. In an adding-machine, the combination of means for listing the items, means for accumulating and printing the total thereof, a platen, a member supporting same, a pivot for said member, a lever, a gear actuated by said lever, and a gear upon said pivot, said first-mentioned gear meshing with and driving said second-mentioned gear, thereby to move the platen into engagement with said listing means or with said accumulating means.

121. In an adding-machine, the combination of rotating means carrying type for listing the items, rotatable keys for actuating said means, rotary mechanism for accumulating and printing the total of said items, and a platen, which, when in one position, engages said accumulating mechanism and in another position engages said printing mechanism, said second-mentioned mechanism being actuated by said first-mentioned mechanism.

122. In an adding-machine, the combination of means for listing the items, rotating keys for actuating same, means for accumulating and printing the total of said items, a platen which is brought into engagement at different times with said printing means and with said accumulating means, and means independent of said aforementioned means for actuating the platen.

123. In an adding-machine, the combination of means for listing the items, rotating

keys for actuating same, means for accumulating and printing the total of said items, a platen which is brought into engagement at different times with said printing means and with said accumulating means, and means independent of said aforementioned means for actuating the platen, said accumulating means being actuated by said listing means.

124. In an adding-machine, the combination of rotatable sectors bearing type for printing the items, finger-depressed keys directly secured to said sectors, means for accumulating and printing the total of said items, a platen which is brought into engagement at different times with said item-printing means and with said accumulating means, and means for actuating the platen.

125. In an adding-machine, the combination of rotatable sectors bearing type for printing the items, finger-depressed keys rotating upon the same shaft as and connected to said sectors, means for accumulating and printing the total of said items, a platen which is brought into engagement at different times with said item-printing means and with said accumulating means, and means for actuating the platen.

126. In an adding-machine, the combination of a segmental rack, an adding-wheel, means meshing with said segmental rack and driven thereby, said means being adapted to actuate said adding-wheel, and a key connected to said rack to actuate same.

127. In an adding-machine, the combination of a segmental rack, a shaft upon which same rotates, an adding-wheel, means meshing with and driven by said rack, said means being adapted to actuate said adding-wheel, and a key connected to and actuating said rack and rotating upon the same shaft as said rack.

128. In an adding-machine, the combination of a rotatable member bearing both type for listing the items and a segmental rack, an adding-wheel, means for driving said wheel, said means meshing with and being driven by said rack, and a key connected to said rack for moving said rack.

129. In an adding-machine, the combination of a rotatable member bearing both type for listing the items and a segmental rack, an adding-wheel, means for driving said wheel, said means meshing with and being driven by said rack, and a key connected to said rack and rotating upon the same shaft as said rack.

130. In an adding-machine, the combination of a segmental rack, an adding-wheel, and means intermediate said segmental rack and said adding-wheel and in intermittent mesh with one of same.

131. In an adding-machine, the combination of a segmental rack, an adding-wheel, and means intermediate said segmental rack and said adding-wheel, said means being adapted to cause said adding-wheel to move as said rack moves in one direction, but leaving said adding-wheel unaffected as said rack moves in the opposite direction.

132. In an adding-machine, the combination of a segmental rack, an adding-wheel, a separate shaft for each, a key rotating upon the same shaft as said rack, and means intermediate said segmental rack and said adding-wheel, said means being adapted to cause said adding-wheel to move as said rack moves in one direction, but leaving said adding-wheel unaffected as said rack moves in the opposite direction.

133. In an adding-machine, the combination of registering mechanism, listing mechanism carried thereupon, and accumulating mechanism simultaneously and positively actuated by said registering mechanism as same actuates the listing means.

134. In a calculating machine, the combination of a series of adding wheels having printing surfaces thereon, a series of members provided with printing numerals and indicating means, means for operating the adding wheels by means of said members, and printing mechanism arranged to print from both the adding wheels and said members.

135. In a calculating machine, the combination of a series of adding devices having printing surfaces thereon, a series of members provided with printing numerals and indicating means, means for operating the adding devices by moving the said members, and printing mechanism arranged to print items from said members and the total from the adding devices.

136. In a calculating machine, the combination of a series of adding devices having sets of printing numerals on their peripheries, segments provided with indicating numerals and printing numerals, means for operating the adding devices by means of the segments, and a printing mechanism arranged to print both from the segments and from the adding devices.

137. In an adding-machine, the combination of registering mechanism, listing mechanism carried thereupon, accumulating mechanism simultaneously and positively actuated by said registering mechanism as same actuates the listing means, and a paper ribbon adapted to engage said listing mechanism and said accumulating mechanism.

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

ADOLPHUS G. MEIER.

Witnesses.
ELLIOTT R. GOLDSMITH,
GLADYS WALTON.