

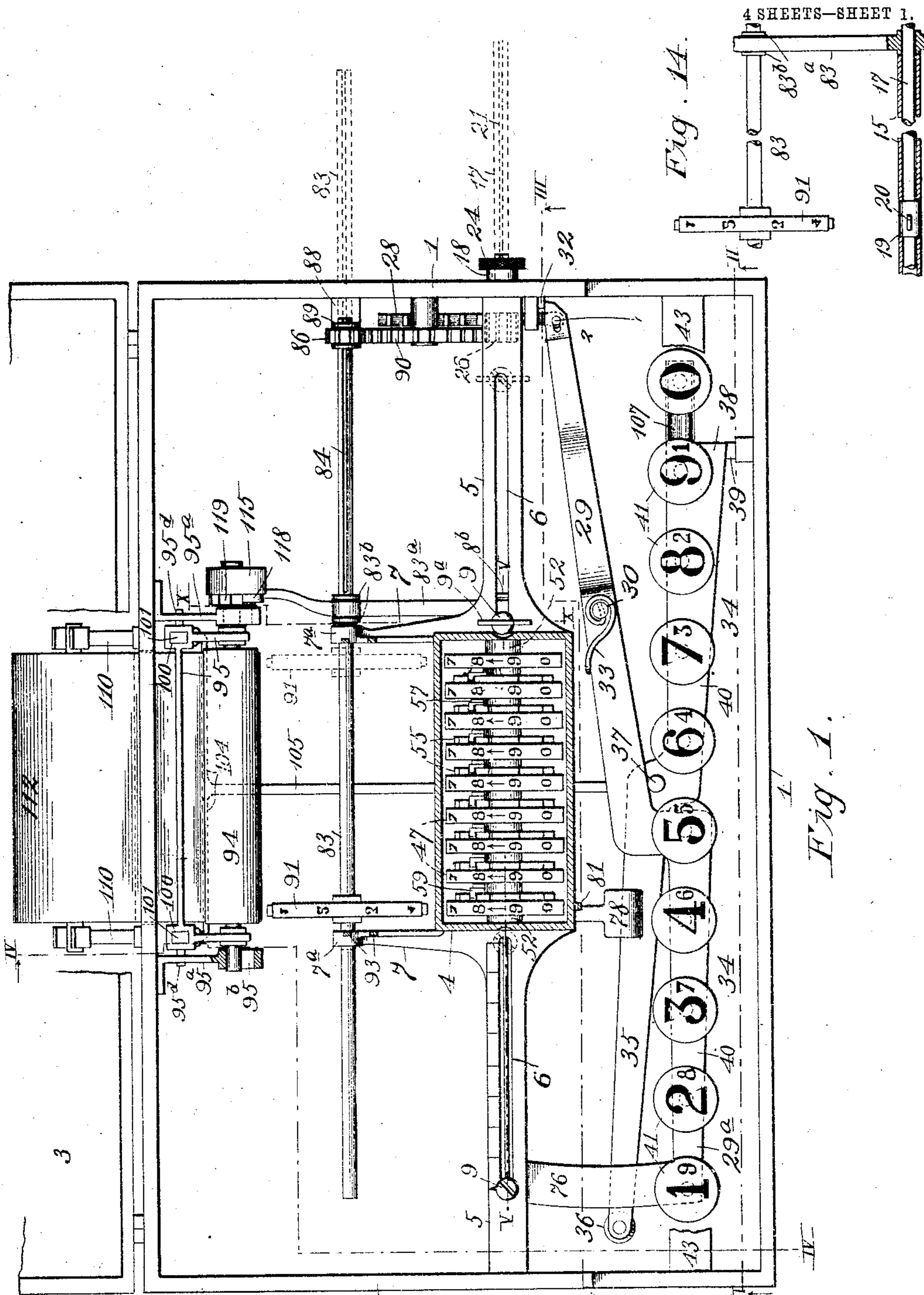
No. 786,493.

PATENTED APR. 4, 1905.

C. B. GARTRELL.

ADDING AND RECORDING MACHINE.

APPLICATION FILED SEPT. 21, 1903.



Witnesses:

R. E. Riley
P. A. Hickey

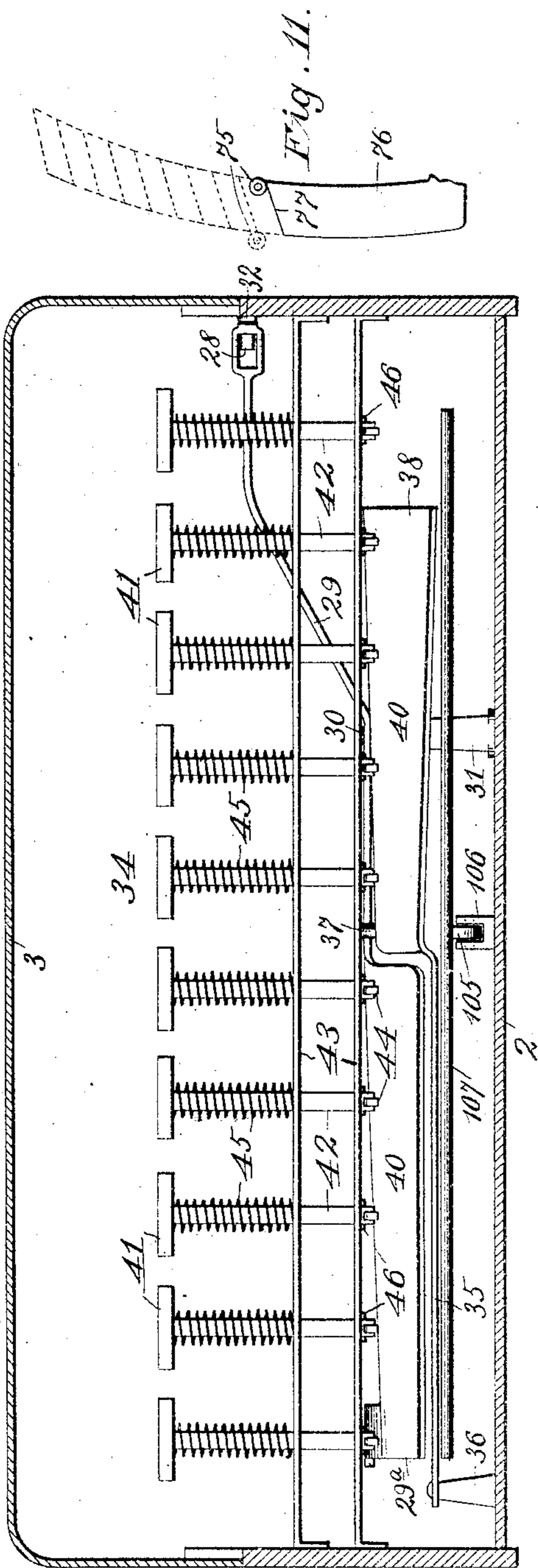
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Charles B. Gartrell

By *F. G. Fischer*
Atty.

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4 SHEETS—SHEET 2.



Witnesses:
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P. A. McKee

Fig. 2.

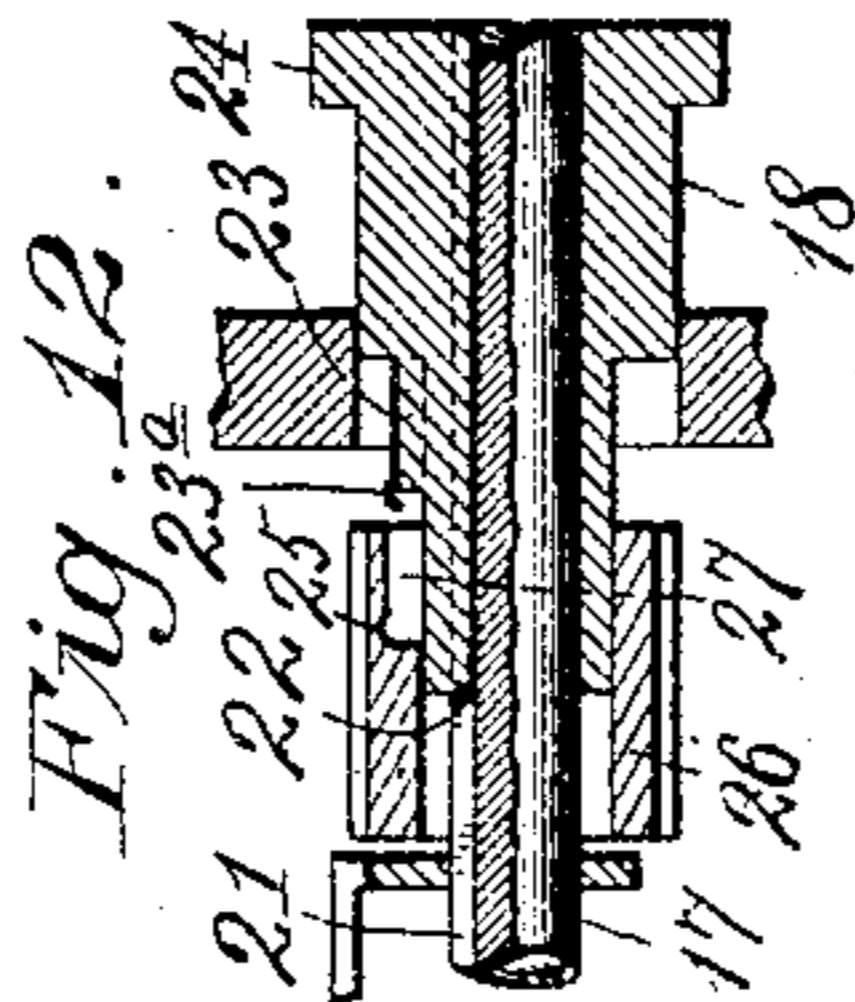
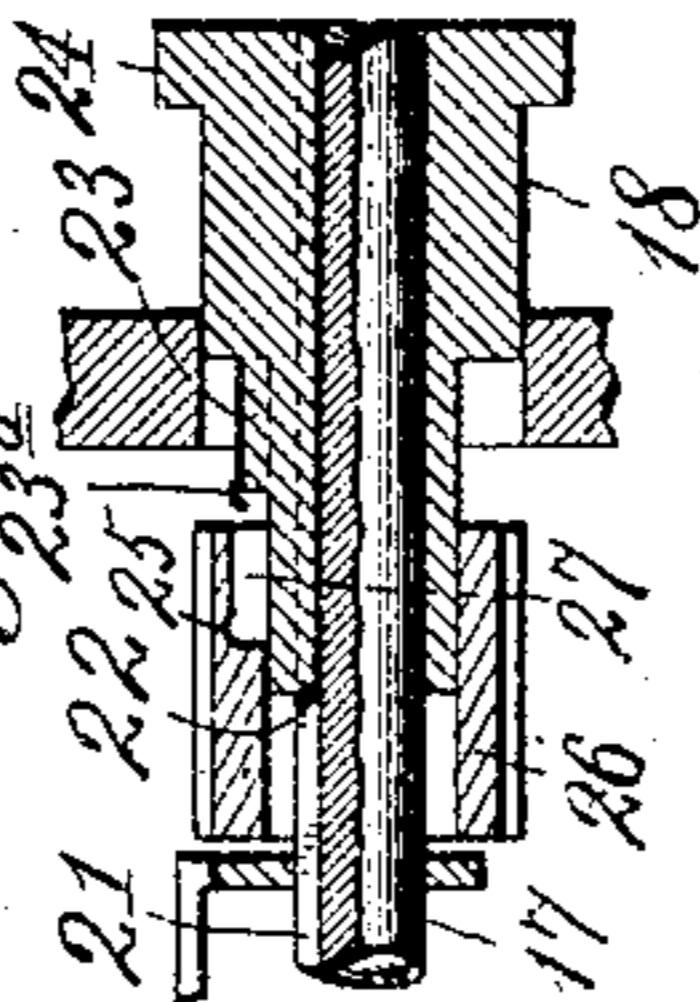


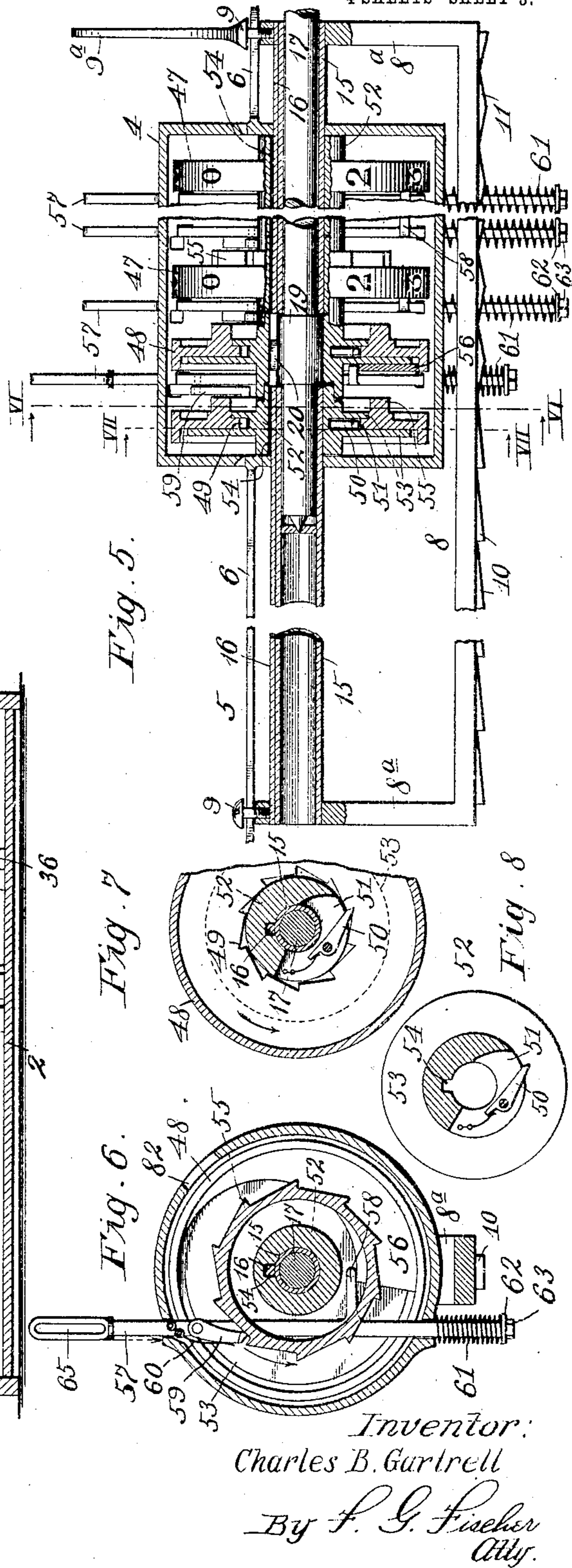
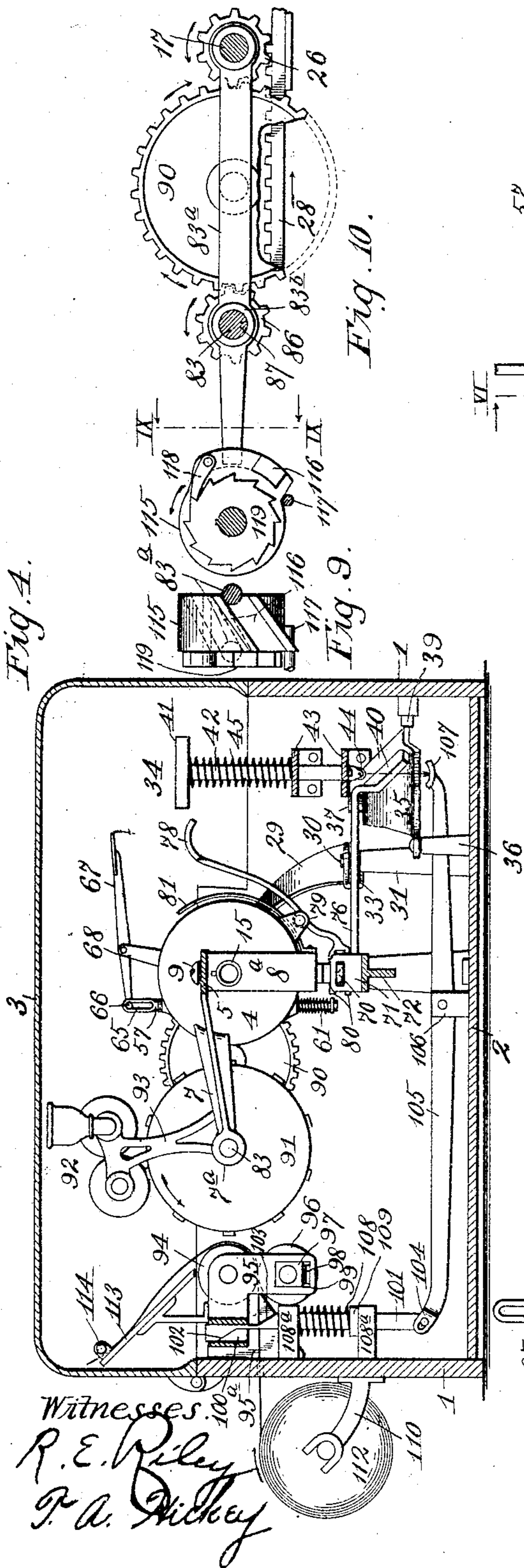
Fig. 12.



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4 SHEETS—SHEET 3.



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4 SHEETS—SHEET 4.

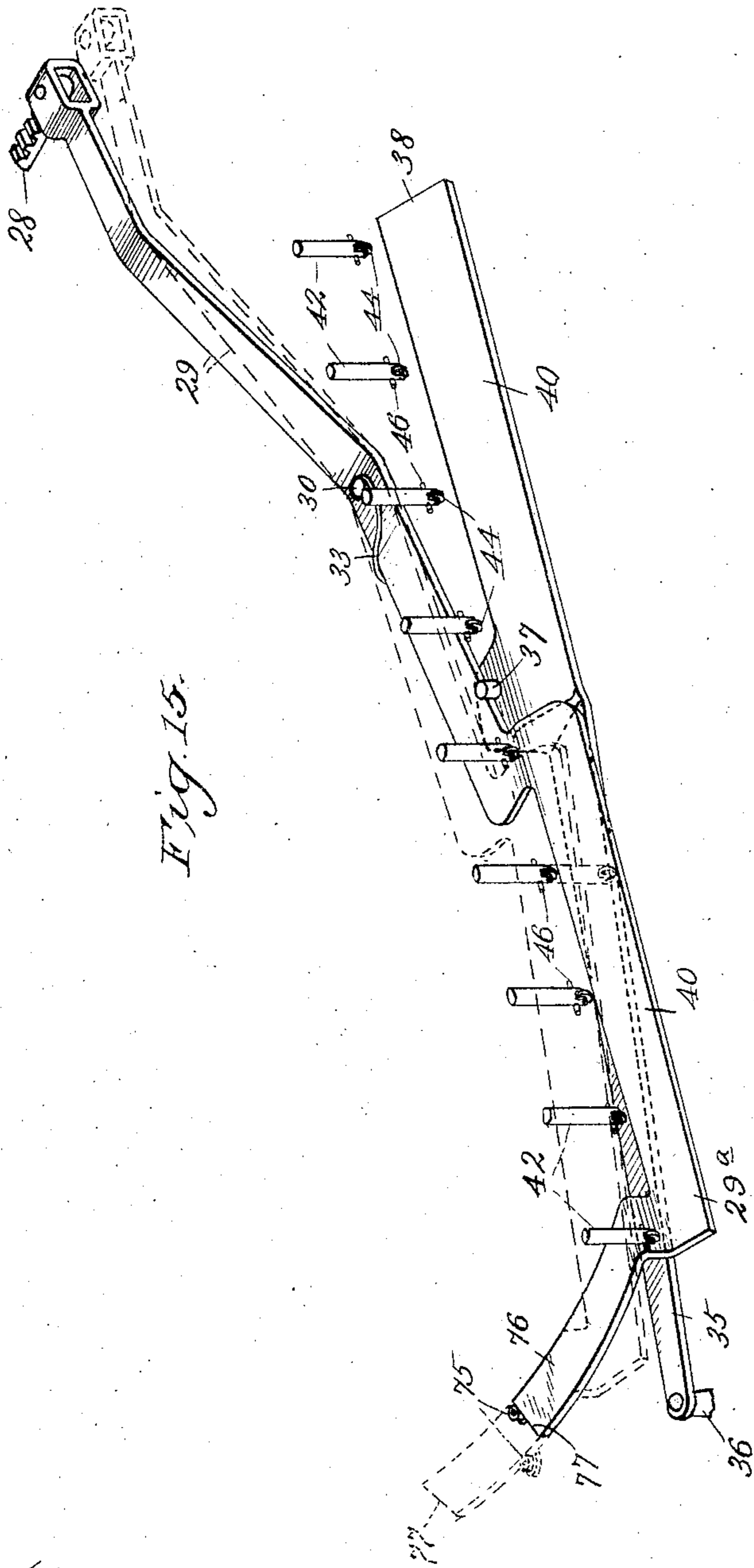


Fig. 15.

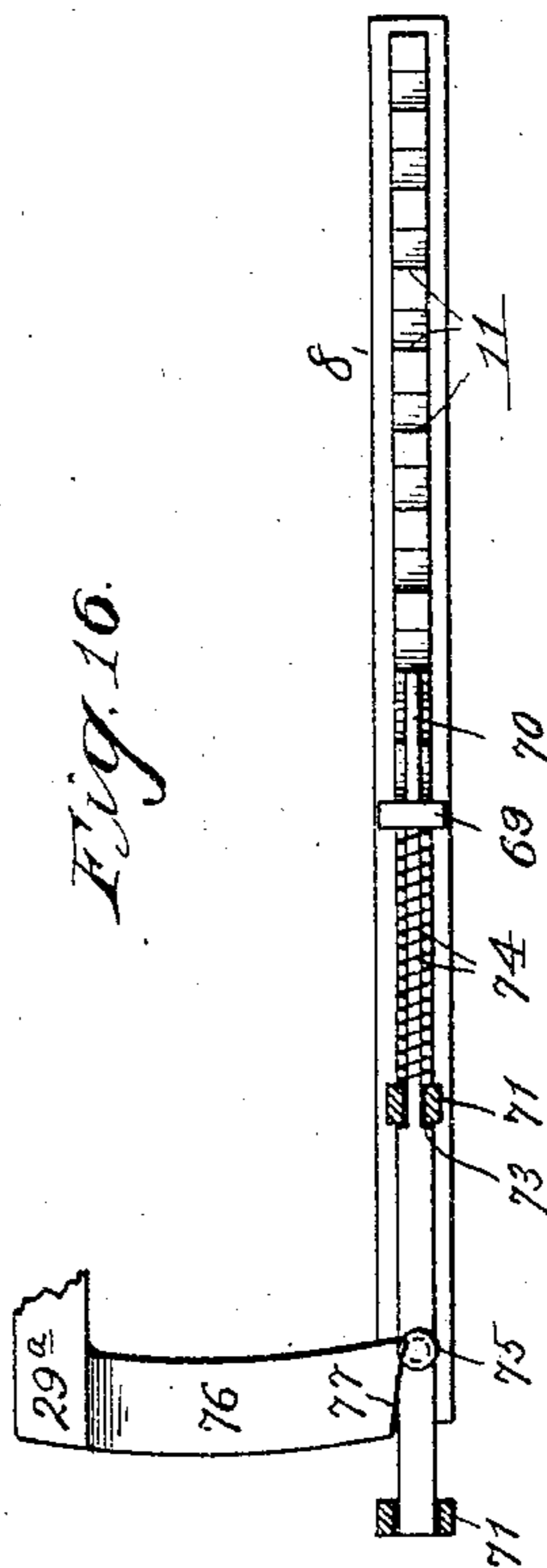


Fig. 16.

Witnesses:

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UNITED STATES PATENT OFFICE.

CHARLES B. GARTRELL, OF KANSAS CITY, MISSOURI.

ADDING AND RECORDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 786,493, dated April 4, 1905.

Application filed September 21, 1903. Serial No. 174,086.

To all whom it may concern:

Be it known that I, CHARLES B. GARTRELL, a citizen of the United States, residing at Kansas City, in the county of Jackson and State of Missouri, have invented certain new and useful Improvements in Adding and Recording Machines, of which the following is a specification.

My invention relates to improvements in adding and recording machines; and my object is to provide a simple machine of this character which will print items in successive lines and columns, accurately add and give the total of said items as they are printed, and print the total without disturbing the adding and totalizing mechanism.

In order that the invention may be fully understood, reference will now be had to the accompanying drawings, in which—

Figure 1 represents a plan view of the machine with the cover in an open position and an inner frame constituting part of the invention in section. Fig. 2 is a longitudinal section of the frame and cover of the machine, taken on line II II of Fig. 1 and showing the keyboard in elevation. Fig. 3 is a longitudinal section taken on line III III of Fig. 1, showing the frame and cover in section and an inner frame and column and carriage spacing mechanism in elevation. Fig. 4 is a transverse section taken on line IV IV of Fig. 1, showing the frame and cover in section and the arrangement of the mechanism in side elevation. Fig. 5 is an enlarged broken vertical section taken on line V V of Fig. 1 and showing the inner frame, carriage, and adding and totalizing mechanism. Fig. 6 is a transverse section of the same, taken on line VI VI of Fig. 5. Fig. 7 is a detail sectional view of one of the adding and totalizing disks and its hub, taken on line VII VII of Fig. 5. Fig. 8 is a detail vertical section of one of the hubs upon which the adding and totalizing disks are mounted. Fig. 9 is a detail front elevation, partly in section, of a line-spacing mechanism, taken on line IX IX of Fig. 10. Fig. 10 is a section taken on line X X of Fig. 1, showing the line-spacing mechanism in side elevation and part of the gearing in section. Fig. 11 is a detail plan view of an arm for operating the column and carriage spacing

mechanism. Fig. 12 is a detail vertical section of a clutch and pinion mounted upon the shaft carrying the adding and totalizing disks. Fig. 13 is a detail side elevation of a paper-feeding mechanism. Fig. 14 is a broken detail plan view showing how the shafts of the item and total printing wheel and the adding and totalizing disks are connected to shift together. Fig. 15 is a detail perspective view of an arm for actuating the carriage-spacing mechanism, compound lever to which the arm is rigidly secured, and keys for operating said lever. Fig. 16 is an inverted plan view of the carriage-spacing mechanism.

In carrying out my invention I employ an outer frame consisting of a rectangular portion 1, a bottom portion 2, and a cover 3, hinged to the rear wall of the rectangular portion.

4 designates a stationary cylindrical frame located within the outer frame and secured to the side walls thereof by oppositely-disposed arms 5, provided with longitudinal slots 6. Said cylindrical frame is also provided at its opposite ends with rearwardly-extending arms 7, terminating in bearings 7^a.

8 designates a carriage consisting of a U-shape frame underlying the stationary frame and suspended at its vertical ends 8^a from arms 5 by screws 9, which operate in slots 6 and one of which is provided with a handle 9^a, that may be grasped to shift the carriage back to its starting-point. The under side of the carriage is provided with equally-spaced ratchet-teeth 10 and similar spaced V-shape teeth 11, forming part of a column and carriage spacing mechanism. Teeth 11 are engaged one at a time by a stop 12, projecting from a hollow post 13 and yieldingly held in engagement with teeth 11 by an expansion-spring 14, located beneath its lower end.

15 designates a pair of tubes slidably arranged in the cylindrical frame and rigidly secured at their outer terminals in the vertical ends of frame 8 by screws 9. Said tubes are provided at their upper surface with feathers 16, extending their entire length.

17 designates a shaft adapted to move longitudinally with the carriage and journaled at its opposite ends in the tubes and slidably arranged in a clutch 18, which latter is jour-

naled in one of the side walls of the outer frame. Shaft 17 is provided near its inner terminal with a collar 19, arranged between the adjacent ends of the tubes and provided
 5 with a feather 20, that registers when the shaft is in its normal position with feathers 16. Shaft 17 is provided at its outer portion with a longitudinal groove 21 for engagement with an internal feather 22 on clutch 18, which
 10 latter is thereby oscillated with the shaft. Clutch 18 is also provided with a short peripheral feather 23 and a knurled head 24, which latter is grasped to shift the clutch longitudinally on shaft 17. Feather 23 is pro-
 15 vided at one end with a curved spring 23^a, adapted to engage a notch 25 in the bore of a pinion 26, journaled upon the clutch and provided with a groove 27, registering with the notch. When it is desired to lock the pinion
 20 upon the clutch, the latter is shifted until feather 23 and spring 23^a engage groove 27 and notch 25, the notch and spring preventing the clutch from becoming accidentally disengaged from the pinion by the longitudinal
 25 movement of the shaft. Pinion 26 is oscillated by an engaging rack-bar 28, pivotally secured at its forward end to the slotted bifurcated terminal of an irregular-shaped lever 29, fulcrumed upon a pin 30,
 30 projecting from the top of a post 31, secured to the bottom of the outer frame. The bifurcated end of said lever is normally held in contact with a stop 32, secured to the adjacent wall of the frame by a contacting spring 33,
 35 secured to pin 30. Lever 29 is oscillated by the first five of ten keys 34 and another irregular-shaped lever 35, extending below and in an opposite direction to lever 29 and pivotally mounted upon a post 36, secured to the
 40 bottom of the outer frame. Lever 35 is provided near its central portion with a pin 37, which projects upwardly into contact with the front edge of lever 29, so that when free end 38 of lever 35 is pressed backwardly said
 45 pin will move the free end 29^a of lever 29 therewith. The forward movement of free end 38 is limited by a stop 39 on the inner surface of the front wall of the outer frame. By thus compounding the leverage the machine
 50 is retained in narrower limits, and the keys will require a more equal pressure than if one long lever were employed. The upper surface of that portion of levers 29 35 arranged below keys 34 is beveled, as indicated by 40,
 55 and the front edge of said portion extends at a certain angle, tapering from end 38 to end 29^a, so that should the keys from "1" to "9" be successively depressed and released pinion 26 will be successively oscillated from one-
 60 tenth to nine-tenths of a revolution. The upper surface 41 of the keys is consecutively numbered "1," "2," "3," &c., from left to right with large numerals and from right to left with small numerals, and their depending
 65 stems 42 extend downwardly through guides

43 and are provided at their lower ends with antifriction-rollers 44 for decreasing the friction when depressed into contact with the beveled surface of the compound lever. The keys are normally retained in an elevated po-
 70 sition by expansion-springs 45, encircling stems 42 and interposed between the upper guide and the upper portion of the keys, and the upward movement of the latter is limited by lugs 46, which project from the lower ends
 75 of the stems and contact with the lower guide.

47 designates a series of adding and totalizing wheels which, counting from the right, represent units, tens, hundreds, &c., and their construction being similar I will proceed to
 80 describe but one of them, which consists of a disk 48, containing ten equally-spaced peripheral characters indicating "0" to "9," inclusive. Said disk is provided with internal ratchet-teeth 49 of equal number to the digits
 85 on its periphery and adapted to be engaged by a spring-actuated pawl 50, pivotally arranged in a recess 51 in a hub 52, upon which the disk is loosely mounted. The disk is re-
 90 tained upon the hub by oppositely-disposed flanges 53, formed integral with the hub, which latter is normally locked from rotation upon one of tubes 15 by feather 16, ex-
 95 tending through a groove 54 in the bore of the hub. Feathers 16 also serve to hold grooves 54 in alinement, so that when feather 20 is in its normal position it may be readily shifted longitudinally with the carriage into engagement with any one of the grooves.

The disks are connected by carrying de-
 100 vices, so that every time one of them completes a revolution it will advance the disk representing the next higher column one step. Each of said carrying devices comprises an
 105 external ratchet-wheel 55, rigidly secured upon one side of the disk, a segmental cam 56, rigidly secured upon the opposite side of the disk, and a vertically-arranged bar 57, extending through frame 4 and provided with an
 110 arm 58 and a pawl 59, which latter is held in engagement with the ratchet-wheel 55 on the adjacent disk by a spring 60. The forward end of arm 58 is turned inwardly into the path of the cam, so the bar will be elevated at each
 115 revolution thereof, and after the cam passes from beneath the arm the bar is immediately depressed by an expansion-spring 61, encircling its lower portion and interposed be-
 120 tween the bottom of frame 4 and a washer 62, retained on the lower end of the bar by a nut 63. As the bar descends pawl 59 engages the ratchet-wheel on the next higher disk and moves the latter one-tenth of a revo-
 125 lution. Bar 58 is provided at its upper end with a slot 65, equal in length to its vertical movement, for the reception of a rod 66, secured at its central portion to an operating-lever 67, pivotally mounted in a support 68, secured to the upper side of frame 4. By de-
 130 pressing the forward end of said lever all of

pawls 59 will be simultaneously elevated out of engagement with ratchet-wheels 55, so that all or any number of the disks may be brought to the starting-point without operating the carrying mechanism.

69 70 designate, respectively, a pawl and a spring-bar, constituting the intermediate portion of the column and carriage spacing mechanism. Pawl 69 is adapted to engage ratchet-teeth 10 and is secured to one end of the spring-bar, which is reciprocally arranged in guides 71, mounted upon a bracket 72, secured to the adjacent side wall of the outer frame. Said bar has a shoulder 73, which is normally held in engagement with the adjacent guide by an expansion-spring 74, interposed between said guide and pawl 69. It is also provided at its under side with a roller 75 for engagement with a segmental arm 76, secured to the free end of lever 29 and beveled at its forward end 77, so that when moved toward the back of the frame by the lever said beveled end will contact with and retract the roller, together with the bar and pawl, to the dotted position. (Shown in Fig. 3.) As the surface of that portion of the compound lever arranged below the keys is beveled and tapers from key "9" to "1," said keys when depressed one at a time will impart variable movements to the lever, so it will cause rack 28 to rotate the pinion 26 anywhere from one to nine tenths of a revolution. The variable movements of the compound lever of course impart similar movements to arm 76, as shown by dotted lines, Fig. 11, so that when said arm is moved toward the back of the frame its beveled end will contact with roller 75 and move bar 70 backward one step. (See dotted lines, Fig. 3.) The length of this step is governed entirely by the width of arm 76 instead of the length of the strokes made by said arm, the variable strokes of the latter being merely incidental to those of the compound lever to which it is secured. When the roller is released on the forward movement of arm 76, pawl 69 will be forced into engagement with the adjacent ratchet-tooth by the expansion-spring and move the carriage longitudinally from left to right the space of one column, where it will be centered by stop 12. The movement of the carriage may be readily reversed after depressing pawl 69 out of the path of the ratchet-teeth with a lever 78, fulcrumed between jaws 79 and having a lower bifurcated terminal 80 loosely engaging the free end of bar 70.

In order that the carriage may be readily shifted to any column, it is provided with a pointer 81, which curves upwardly in front of frame 4 and terminates opposite a scale 82^a, arranged below a longitudinal slot 82 in the upper portion of said frame, so the numerals on the adding and totalizing disks may be easily read by the operator.

83 designates a longitudinal shaft journaled

and slidably arranged in bearings 7^a and provided with a longitudinal groove 84. It is rotated by a loosely-mounted pinion 86 of equal size to pinion 26 and provided with a feather 87, which engages groove 84. Said pinion is prevented from moving longitudinally with the shaft by a support 88, secured to the adjacent side wall of the outer frame and provided with a bifurcated end 89 extending upwardly on the opposite sides of the pinion, which latter is driven by a large intermediate cog-wheel 90, that in turn is driven by pinion 26, the face of which latter is wide enough to engage said intermediate cog-wheel 90 and rack-bar 28. Shaft 83 is moved longitudinally with shaft 17 by a connecting-arm 83^a, secured to shaft 83 by collars 83^b on shaft 83 and to shaft 17 by the adjacent end of the carriage and a bracket 8^b on the latter. The rear end of arm 83^a is cylindrical and extends to the rear of shaft 83 for the purpose of engaging and operating a line-spacing mechanism hereinafter described.

91 designates an item and total printing wheel rigidly mounted upon shaft 83, between bearings 7^a, and provided with peripheral printing-numerals from "0" to "9," inclusive, which are supplied with ink from a font 92 of any suitable construction and supported by brackets 93, extending upwardly from arms 7. The item and total printing-wheel is mounted in a direct line to the rear of collar 19, (see Fig. 14,) and as it is arranged to operate synchronously therewith it will be understood that when the printing-wheel is shifted to print in a certain column the collar will be shifted therewith and engage the hub of the corresponding disk, so that all the items printed in said column will be accurately added, and this of course is true of any column.

94 designates a platen journaled in a frame 95, provided with a friction-roller 96, journaled beneath the platen in boxes 97 and yieldingly held in contact therewith by springs 98, interposed between the bottom of slots 99 and boxes 97. Frame 95 is slidably supported by brackets 95^a, secured to the rear wall is the outer frame and provided with slots 95^b for the reception of the platen-shaft and slots 95^c for pins 95^d, projecting from the opposite sides of frame 95. Said frame is also provided at its rear opposite ends with slots 100 for the reception of a pair of vertically-operating bars 101, provided at their upper portions with beveled surfaces 102 103, respectively, the former of which on the downward movement of the bars contacts with the upper edge of slots 100, and thus moves the frame and platen away from the printing-wheel, while the latter on the upward movement of said bars contacts with the lower edge of the grooves and moves the frame forward so that the paper on the platen will be brought into contact with the adjacent character on the printing-wheel. The lower ends of bars 101

are pivotally secured to the slotted bifurcated rear end 104 of a lever 105, pivotally secured in the forked upper end of a post 106 and provided at its forward end with a bar 107, underlying the forward portion of the compound lever and provided with a concave upper surface for the reception of rollers 44 when the latter are depressed into contact therewith. The rear end of lever 105 is normally retained in a depressed position by expansion-springs 108, encircling bars 101 and interposed between the upper set of guides 108^a and collars 109, which latter contact with the lower guides, and thus limit the downward movement of the bars.

110 designates a pair of bifurcated arms secured to the rear wall of frame 1 for the reception of a shaft containing a roll of paper 112, the free end of which is passed between the platen and friction-roller and between an inclined support 113 and a longitudinal rod 114, secured to the upper end of the support, so the items may be read by the operator as they are printed on the paper.

The platen is rotated one step at a time by a line-spacing mechanism consisting of a cam 115, loosely mounted upon one end of the platen-shaft and provided at its forward surface with an inclined groove 116, the upper end of which is normally held in the path of arm 83^a by a pin 117 projecting beneath the forward portion of the cam, which latter is provided on one side with a pivotally-mounted gravity-pawl 118 for engagement with a ratchet-wheel 119, rigidly mounted upon the platen-shaft. As the carriage is drawn to the extreme end of its left-hand movement the rounded terminal of arm 83^a slides along the upper surface of groove 116 and rotates the cam to the dotted position shown in Fig. 9, where it is retained by the arm. When the latter is drawn to the right, it contacts with the lower surface of the groove and depresses the lower forward portion of the cam again into contact with pin 117. While the forward end of the cam is being elevated pawl 118 rotates the ratchet and platen one step, which movement brings the paper in position to receive a new line of items.

In operation disks 48 are arranged in their normal position with their "0" in coincidence with slot 82 and the carriage is drawn to the extreme end of its left-hand movement. This brings feather 20, the printing-wheel 91, the "0" of which is opposite platen 94, to the hundred millions column. Then if it is desired to print the item "two hundred and fifty-six millions" the second key is depressed, which causes shafts 17 83 to rotate two-tenths of a revolution, bringing the numeral "2" on the disk representing the highest denomination in coincidence with slot 82 and the numeral "2" on the printing-wheel opposite the platen, so that when the latter is forced forward by the depression of lever 105 the paper thereon

will be brought into contact with said numeral and receive an ink impression therefrom. The downward movement of the key also retracts pawl 69, causing the compression of spring 74, so that when feather 20 and the printing-wheel are returned to their normal position by spring 33 spring 74 will immediately force the carriage one step to the right and bring the feather and the printing-wheel to the ten millions column ready for number "5," which is brought into position by depressing the fifth key. Upon performing the latter movement the operation above described is repeated, with the exception that feather 20 and the printing-wheel are rotated five-tenths of a revolution instead of but two-tenths. After "5" has been printed the carriage is automatically shifted to the next lower column to receive number "6," which is printed by depressing the sixth key. The following six ciphers are then successively printed to complete the item by depressing the cipher-key six times, which brings the paper into contact with the "0" on the printing-wheel an equal number of times without operating the compound lever or shafts 17 85. As the carriage-spacing mechanism is not affected by the operation of the cipher-key, the carriage is shifted by hand step by step in order to bring the printing-wheel to the next lower column after each depression of said key. As the three disks, rotated, respectively, two, five, and six-tenths of a revolution by feather 20 through the instrumentality of their respective hubs 52, did not return to the starting-point with said hubs, the number on said disks appearing through slot 82 will correspond with the number printed on the paper. After the item "two hundred and fifty-six millions" has been printed pawl 69 is depressed and the carriage and printing-wheel are shifted back to the starting-point. This shifting movement automatically rotates the platen one step and brings the paper in position to receive the next item by drawing the terminal of arm 83^a laterally through groove 116, which elevates the front portion of the cam and rotates the platen through the instrumentality of the engaging pawl and ratchet-wheel 118 119, respectively. (See Figs. 8 and 9.) If the next item to be printed is the same as the first, the operation above described is repeated, and the result obtained will be identical, with the exception that the total of the two items will be added by the disks and show through slot 82. After a number of items have been recorded on the paper their total may be readily printed without disturbing the total given by the disks by withdrawing feather 23 from groove 27, which permits pinion 26 to turn loosely on clutch 18, so the latter will remain stationary and not operate shaft 17 when the proper keys to print said total are depressed. When the total has been printed, the disks may be

readily returned to their normal position after disconnecting the carrying mechanism by adding. For instance, if numeral "2" appears at slot 85 on the disk representing the highest denomination, by positioning the carriage so that feather 20 will engage the hub of said disk and depressing the eighth key the disk will be rotated an additional eight-tenths of a revolution. This addition of eight-tenths to the two-tenths previously obtained equals one revolution of the disk, and consequently returns the latter to its normal position.

If desired, the printing mechanism may be dispensed with by placing raised characters on the face of the disks and printing therefrom.

Although I have shown the machine complete within itself, it is obvious that by making minor changes in its arrangement it could be readily applied to a type-writing machine, in which case the present keys and ink-font could be dispensed with and the keyboard and ribbon mechanism of the type-writer substituted. I also reserve the right to make such other changes as properly fall within the spirit and scope of the appended claims.

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

30 1. In an adding-machine, a series of hubs, a pair of tubes slidably arranged in said hubs and adapted to normally hold them in a rigid position, a projection operatively arranged between the adjacent ends of said tubes and adapted to be slid by the latter into positive engagement with any of the hubs, means for oscillating the projection, and character-bearing disks mounted upon the hubs and adapted to be rotated in but one direction by the latter.

40 2. In an adding-machine, a series of hubs, a pair of tubes slidably arranged in said hubs and adapted to normally hold them in a rigid position, a projection operatively arranged between the adjacent ends of said tubes and adapted to be slid by the latter into positive engagement with any of the hubs, suitable means for oscillating said projection, means for preventing the hubs from sliding longitudinally with the tubes, and character-bearing disks mounted upon the hubs and adapted to be rotated in one direction therewith.

50 3. A series of hubs, a carriage, a pair of tubes rigidly secured thereto and slidably arranged in said hubs which they are adapted to normally hold in a rigid position, a projection operatively arranged between the adjacent ends of said tubes and adapted to be slid into positive engagement with any of the hubs, means for oscillating the projection, and character-bearing disks mounted upon the hubs and adapted to be rotated in one direction therewith.

60 4. A series of grooved hubs arranged in a stationary frame, a pair of tubes slidably arranged in the hubs and the frame and provided

with feathers for normally holding the grooves in alinement, a shaft journaled in the tubes and adapted to slide therewith, a feather on said shaft arranged between the adjacent ends of the tubes and which engages, one at a time, the grooves in the hub, means for oscillating the shaft, means for holding the shaft so its feather will normally be in alinement with the feathers on the tubes, and character-bearing disks suitably mounted upon the hubs.

5. A series of adding-disks provided with a carrying mechanism consisting of cams secured to the sides of the disks, pawl-carrying bars provided with arms projecting in the path of the cams and adapted to be elevated at each revolution of the latter, ratchet-wheels on the next higher disks engaged by the pawls, means for automatically depressing the bars after each revolution of the cams so the next higher disks will be advanced one step, and means for disengaging the pawls from the ratchet-wheels so each disk may be returned to the starting-point without advancing the next higher disk one step, in combination with means for independently rotating the disks variable distances.

6. A series of adding-disks provided with a carrying mechanism consisting of segmental cams secured to the disks, pawl-carrying bars provided with arms projecting in the path of the cams and adapted to be elevated at each revolution of the latter, ratchet-wheels on the next higher disks engaged by the pawls, means for depressing the bars after each revolution of the cams so the next higher disks will be advanced one step, and means for simultaneously disengaging the pawls from the ratchet-wheels so each disk may be returned to the starting-point without advancing the next higher disk one step, in combination with means for independently rotating the disks variable distances.

7. A series of adding-disks provided with a carrying mechanism consisting of cams secured to the disks, pawl-carrying bars having slotted terminals at one end and provided with arms projecting in the path of the cams and adapted to be reciprocated at each revolution of the latter, ratchet-wheels on the next higher disks engaged by the pawls, a rod engaging the slotted ends of the bars, and a lever for operating said rod, in combination with means for independently rotating the disks variable distances.

8. In an adding-machine, a frame, a carriage slidably supported thereby, a shaft journaled in the carriage and extending through part of the frame, a series of hubs loosely mounted upon that portion of the shaft extending through the frame and provided with grooved bores, means for normally holding the grooves in alinement, a feather on the shaft adapted to engage any one of the grooves by shifting the carriage, a keyboard, mechanism connecting the keyboard to the shaft for os-

cillating the latter variable distances, and adding-disks mounted upon the hubs adapted to turn in but one direction with the latter.

9. In an adding-machine, a frame having a
5 slotted cylindrical portion, a carriage slid-
ingly supported by said frame, a shaft jour-
naled in the carriage and extending through
the axis of the cylinder, a series of hubs loosely
mounted upon that portion of the shaft ex-
10 tending through the frame and provided with
grooved bores, means for normally holding the
grooves in alinement, a feather on the shaft
adapted to engage any one of the grooves by
shifting the carriage, a keyboard, mechanism
15 connecting the keyboard to the shaft for os-
cillating the latter variable distances, and add-
ing-disks mounted upon the hubs adapted to
turn in but one direction with the latter.
10. In an adding-machine, a frame, a car-
20 riage slidably supported thereby, means for
automatically shifting the carriage step by
step, a shaft journaled in the carriage and ex-
tending through part of the frame, a series
of hubs loosely mounted upon that portion
25 of the shaft extending through the frame and
provided with grooved bores, means for nor-
mally holding the grooves in alinement, a
feather on the shaft adapted to engage any
one of the grooves by shifting the carriage,
30 a keyboard, mechanism connecting the key-
board to the shaft for oscillating the latter
variable distances, and adding-disks mounted
upon the hubs adapted to turn in but one di-
rection with the latter.
11. In an adding-machine, an outer frame,
35 an inner frame comprising a central cylindrical
slotted portion and arms integral with the op-
posite ends of the cylinder secured at their
outer ends to the outer frame, a U-shaped car-
riage slidably suspended from the arms, a
40 shaft journaled in the carriage and extending
through part of the frame, a series of hubs
loosely mounted upon that portion of the shaft
extending through the frame and provided
45 with grooved bores, means for normally hold-
ing the grooves in alinement, a feather on the
shaft adapted to engage any one of the grooves
by shifting the carriage, a keyboard, mech-
anism connecting the keyboard to the shaft
50 for oscillating the latter variable distances,
and adding-disks mounted upon the hubs
adapted to turn in but one direction with the
latter.

12. In an adding-machine, a series of hubs
55 suitably mounted, a series of keys carried by
the machine and adapted to be depressed a uni-
form distance, a tapering lever adapted to be
moved variable distances by the keys, suitable
connections between the lever and hubs where-
60 by variable oscillatory movement is independ-
ently imparted to said hubs by the lever, and
character-bearing disks mounted upon the
hubs and arranged to turn in but one direc-
tion therewith.

- 65 13. In an adding-machine, a series of hubs

suitably mounted, a series of keys carried by
the machine and adapted to be depressed a uni-
form distance, a tapering beveled lever ar-
ranged vertically below the keys and adapted
to be moved variable distances by the latter, 70
suitable connections between the lever and
hubs whereby variable oscillatory movement
is independently imparted to said hubs by the
lever, and character-bearing disks mounted
upon the hubs and arranged to turn in but 75
one direction therewith.

14. In an adding-machine, a series of hubs
suitably mounted, a series of keys carried by
the machine and adapted to be depressed a uni-
form distance, a compound lever having two 80
tapering beveled members, suitable connec-
tions between the lever and hubs whereby
variable oscillatory movement is independ-
ently imparted to said hubs by the lever, and
character-bearing disks mounted upon the 85
hubs and arranged to turn in but one direc-
tion therewith.

15. In a machine of the character described,
a series of hubs suitably mounted, a series of
keys carried by the machine and adapted to 90
be depressed a uniform distance, a tapering
lever adapted to be moved variable distances
by the keys, suitable connections between the
lever and hubs whereby variable oscillatory
movement is independently imparted to said 95
hubs by the lever, character-bearing disks
mounted upon the hubs and arranged to turn
in but one direction therewith, and printing
mechanism operated by the lever, and adapted
to operate independently of the hubs or simul- 100
taneously therewith.

16. A carriage provided with a journaled
shaft having a feather, means for shifting and
oscillating the shaft, a set of hubs arranged
within a stationary frame and adapted to be 105
engaged and oscillated one at a time by the
shaft, adding-wheels mounted on the hubs and
adapted to be rotated in one direction thereby,
a second shaft journaled in the stationary
frame and arranged to shift and oscillate with 110
the first-mentioned shaft, and a printing-wheel
rigidly mounted upon said second shaft.

17. A carriage provided with a journaled
shaft having a feather, keys for oscillating the
shaft variable distances, a set of hubs arranged 115
within a stationary frame and adapted to be
engaged and oscillated one at a time by the
feather, adding-disks mounted on the hubs
and adapted to be rotated in one direction
thereby, a second shaft journaled in the sta- 120
tionary frame and arranged to shift and oscil-
late with the first-mentioned shaft, and a print-
ing-wheel rigidly mounted upon said second
shaft.

18. A carriage provided with a journaled 125
shaft having a feather, a compound lever suit-
ably secured to the shaft, keys adapted to im-
part a variable stroke to said lever, a set of
hubs arranged within a stationary frame and
adapted to be engaged and oscillated one at a 130

time by the shaft, adding-disks mounted on the hubs and adapted to be rotated in one direction thereby, a second shaft journaled in the stationary frame and arranged to shift and oscillate with the first-mentioned shaft, and a printing-wheel mounted upon said second shaft.

19. A carriage, suitable spacing mechanism for shifting said carriage longitudinally, a shaft journaled in the carriage provided with a longitudinal groove, a feather formed integral with the shaft, a pinion through which one end of the shaft slides, means for causing the pinion to rotate with said shaft, a rack-bar meshing with the pinion, a compound lever pivotally secured to the rack-bar, keys adapted to impart a variable stroke to the lever, a set of grooved hubs through which the shaft slides and in which it rotates, the feather on the shaft engaging and rotating the grooved hubs one at a time with the shaft, and adding-disks mounted upon the hubs so as to rotate in one direction therewith.

20. A carriage, spacing mechanism for shifting said carriage, a shaft journaled in the car-

riage provided with a longitudinal groove, a feather formed integral with the shaft, a clutch through which one end of the shaft slides, an internal feather on the clutch which engages the groove in the shaft, a peripheral feather on the clutch, a pinion loosely mounted upon the clutch provided with an internal groove adapted to be engaged by the peripheral feather on the clutch, a rack-bar meshing with the pinion, a lever pivotally secured to the rack-bar, keys adapted to impart a variable stroke to the lever, a set of grooved hubs through which the shaft slides and in which it rotates, the feather on the shaft engaging and rotating the grooved hubs one at a time with the shaft, and adding-disks mounted upon the hubs so as to rotate in one direction therewith.

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

CHARLES B. GARTRELL.

Witnesses:

F. G. FISCHER,

LESLIE E. BAIRD.