No. 844,505. PATENTED FEB. 19, 1907.

S. H. DRYSDALE.

ADDING MACHINE.

APPLICATION FILED FEB. 14, 1906.

2 SHEETS—SHEET 1.

Fig. 1.

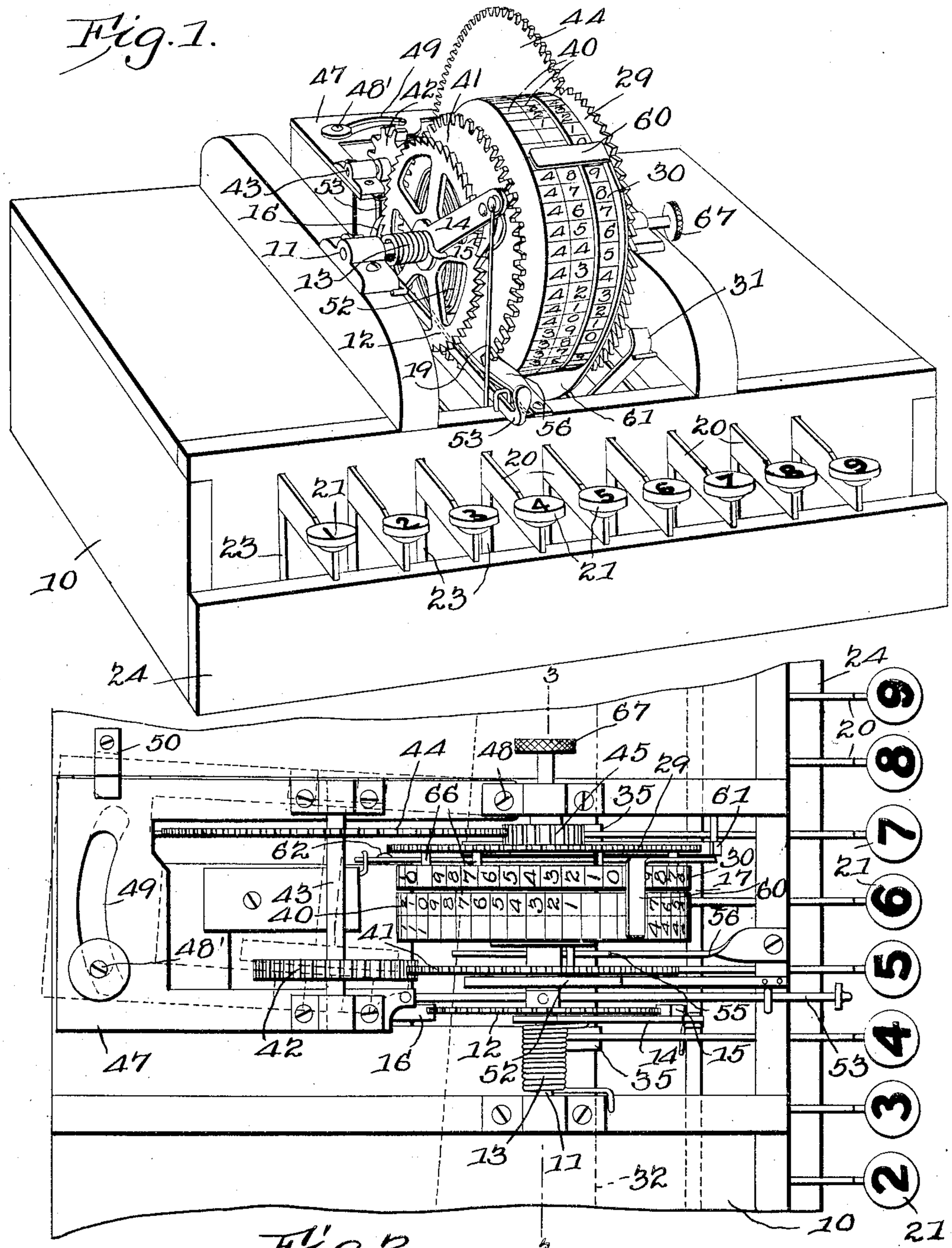

Fig. 2.

WITNESSES:

E. F. Allen

Jno. E. Parker

Stephen H. Drysdale, INVENTOR

By Church & Co

ATTORNEYS

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2 SHEETS—SHEET 2.

Fig. 3.

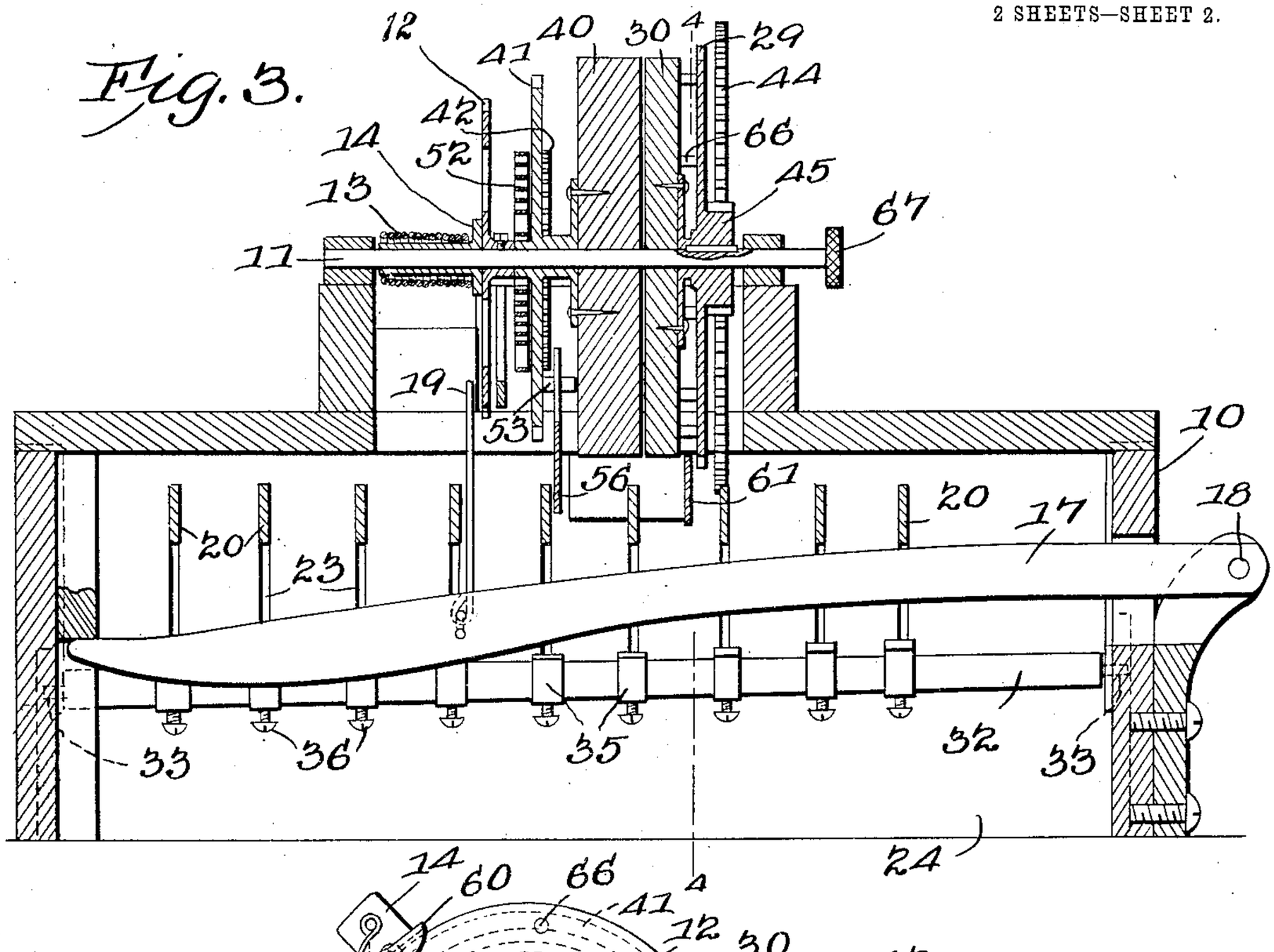
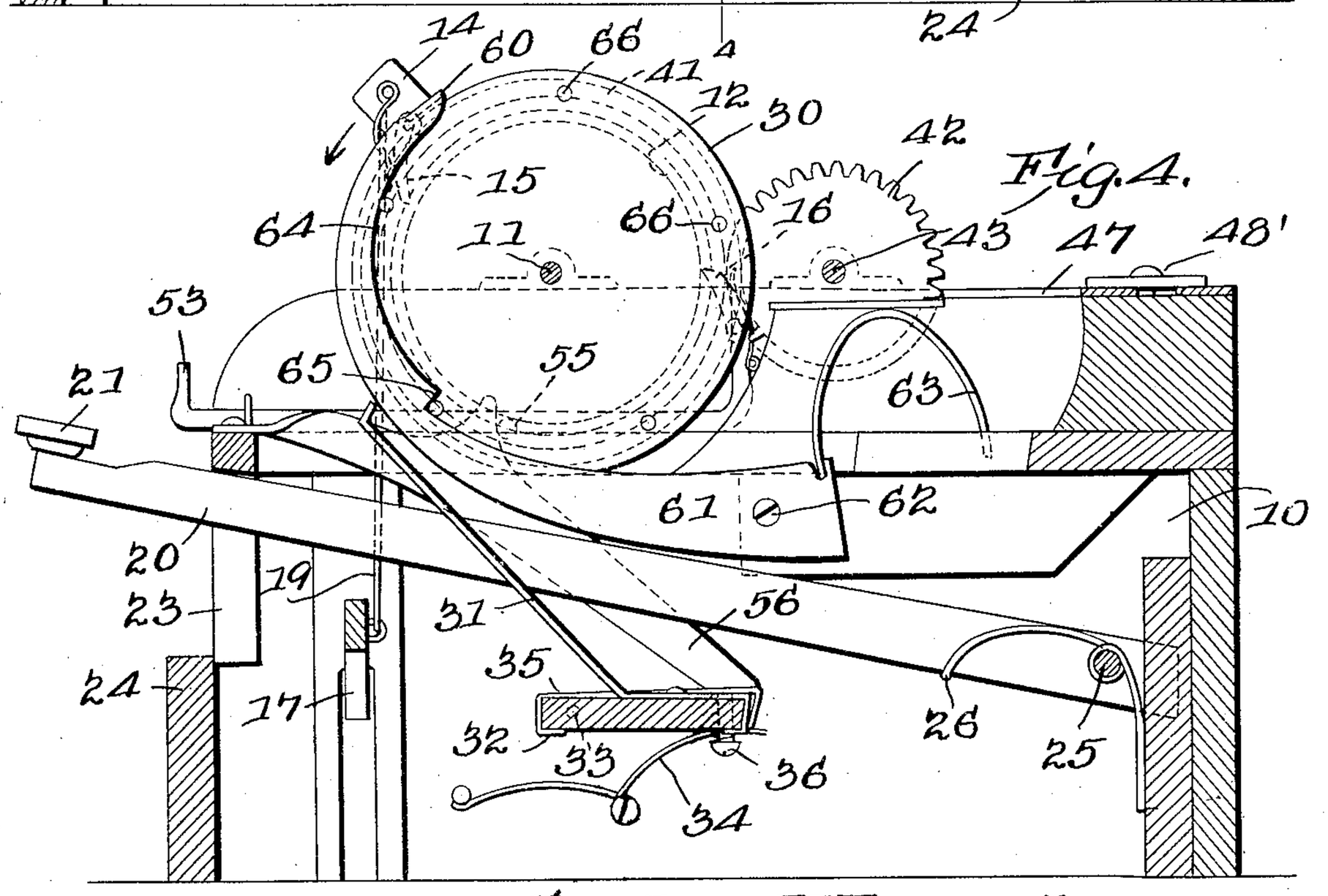


Fig. 4.



WITNESSES:

E. J. Stewart

Jno. E. Parker

Stephen H. Drysdale, INVENTOR

By Cachow & Co

ATTORNEYS

UNITED STATES PATENT OFFICE.

STEPHEN H. DRYSDALE, OF VERSAILLES, MISSOURI.

ADDING-MACHINE.

No. 844,505. Specification of Letters Patent. Patented Feb. 19, 1907.

Application filed February 14, 1906. Serial No. 301,065.

To all whom it may concern:

Be it known that I, STEPHEN H. DRYSDALE, a citizen of the United States, residing at Versailles, in the county of Morgan and State of Missouri, have invented a new and useful Adding-Machine, of which the following is a specification.

This invention relates to adding-machines, and has for its principal object to provide a mechanism of simple and inexpensive construction which may be employed in all ordinary work of addition, the machines being especially provided for adding single columns of figures.

A further object of the invention is to provide totaling-disks in which the numerals are grouped, each group including the nine numerals and naught and the groups being divided from each other by a blank space equal to that occupied by one numeral, provision being made for indicating the correct reading-point.

A further object of the invention is to provide a novel form of totaling mechanism in which movement of a units-disk is continuously transmitted to a tens or higher disk and to employ in connection therewith a total-indicator, which moves with the tens or higher disk in order that the correct total may be ascertained.

A still further object of the invention is to provide a reading-indicator that is moved with one of the disks until a sum exceeding nine is to be transmitted from a lower disk to a higher disk and which then is moved a step backward to display a higher numeral on the second or higher disk.

A still further object of the invention is to provide a simple keyboard mechanism in which all of the keys and key-levers may be of precisely the same construction in order to reduce the cost of manufacture and in which all levers have the same stroke, regardless of the values which they represent.

A still further object of the invention is to provide a novel form of stop mechanism for preventing excess movement of the disks under any momentum acquired on sudden depression of the keys.

A still further object of the invention is to provide a simple means for restoring the parts to zero position at the completion of each operation.

With these and other objects in view, as will more fully hereinafter appear, the invention consists in certain novel features of construction and arrangement of parts, hereinafter fully described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims, it being understood that various changes in the form, proportions, size, and minor details of the structure may be made without departing from the spirit or sacrificing any of the advantages of the invention.

In the accompanying drawings, Figure 1 is a perspective view of an adding-machine constructed in accordance with the invention. Fig. 2 is a plan view of a portion of the same. Fig. 3 is a longitudinal sectional elevation of the machine on the line 3 3 of Fig. 2. Fig. 4 is a transverse sectional elevation of the machine on the line 4 4 of Fig. 3.

Similar numerals of reference are employed to indicate corresponding parts throughout the several figures of the drawings.

The working parts of the machine are supported by a suitable casing 10, of which the lower portion is illustrated in the drawings. An auxiliary upper casing may be placed over the indicating-disks and their connecting-wheels and provided with a transparent panel adjacent to the peripheries of the disks, if desired.

On a suitable horizontal shaft 11, mounted in the bearings of the upper portion of the frame, is secured a fifty-toothed ratchet-wheel 12, which on the depression of each key is rotated to the extent of one, two, three, or more teeth in accordance with the value represented by the key depressed. The shaft carries a spring 13, and on the shaft is loosely pivoted a pawl-carrying arm 14, having a spring-pressed pawl 15 engaging with the teeth of said ratchet-wheel. The spring has one end engaging the arm and the opposite end engaging the fixed frame, the function of said spring being to restore the arm 14 to initial position after each advance of the ratchet-wheel, and said ratchet-wheel is retained in the position to which it is moved by a suitable retaining-pawl 16.

In the lower portion of the frame is arranged a lever 17, that is pivoted on a stud 18, carried by a suitable bracket projecting from the frame. This lever is connected to the pawl-carrying arm by a rod 19 and extends under a series of nine key-levers 20, all of precisely the same construction and each being provided at its outer end with a suitable finger-button 21, bearing a numeral

designating the value of the key. The free end of the lever is guided in a suitable slot 23 at one end of the frame, and its upward movement is limited by engagement with the end wall of said slot, as shown in Fig. 3.

All of the keys have the same stroke, the downward movement being limited by a stop-bar 24; but as the active movement transmitted to the lever 17 must vary in accordance with the value represented by the key the key-levers have more or less idle movement in accordance with the values which they represent. Thus, as shown in Fig. 3, the upper surface of the lever 17 is arranged on a curved inclined line, and the key-lever 20 to the right, which represents a value of nine, is in contact with the lever 17, so that a long stroke of the latter may be effected when said key-lever is depressed, while the key-lever to the left, representing a value of one, has idle movement for the greater portion of its stroke and transmits active movement to the lever 17 to the extent of a single tooth of the ratchet-wheel 12.

All of the key-levers are pivoted at their inner ends on a rod 25, that is supported at the rear portion of the casing, and the rod carries torsion-springs 26, which bear against the frame and the lever and tend to maintain the levers in elevated position.

Rigidly secured to the shaft 11 is a fifty-toothed ratchet-wheel 29 and a primary totaling-disk 30, the teeth of the wheel 29 being engaged by a stop-pawl 31, which is moved into contact with the teeth at the completion of the downward stroke of each key, the object being to prevent excess movement of the totaling-disk under momentum acquired from the sudden depression of a key. The stop pawl or bar 31 is carried by a bar 32, arranged within the lower portion of the casing and having pivot-pintles 33, that extend into suitable bearing-openings formed in the end walls of the casing to allow the bar to rock. Normally the rear end of the bar is held elevated and the front edge depressed by means of a spring 34, as shown in Fig. 4, and the stop-pawl 31 is thus held out of engagement with the teeth of the ratchet-wheel 29.

The bar 32 is disposed in the path of downward movement of the key-lever, and said bar carries a number of adjustable key-engaging strips 35, of which there is one below each of the key-levers. The front edges of the strips 35 are secured to the front edge of the bar 32, while the rear edges thereof rest on screws 36 extending through the bar 32, and said screws may be adjusted for the purpose of bringing the strips into correct position to be engaged and depressed, together with bar 32, during the final portion of the down key-stroke. As the key-lever descends it will engage its strip 35, and then movement will be transmitted through the screw 36 to the bar 32, rocking the latter on its pintles 33 and throwing the stop-pawl 31 into engagement with the teeth of the ratchet-wheel 29. The key-lever engages the strip 35 immediately in advance of the completion of the down-stroke, so that the pawl will be moved up to tooth-engaging position in readiness to receive the impact of a tooth of the ratchet-wheel, and the latter cannot move through a greater distance than that represented by the value of the key-lever depressed.

The periphery of the units-disk 30 is divided into fifty-five spaces in the present instance, while the ratchet-wheels have but fifty teeth. In these fifty-five spaces are arranged groups of numerals from "0" to "9," and each group is separated by a blank space of a width equal to that occupied by one numeral. This is rendered necessary by the peculiar form of transfer mechanism employed, as will hereinafter appear.

Mounted loosely on the shaft 11 is a tens and hundreds disk 40, the periphery of which is divided into fifty spaces, two of which are blank, and in the remaining spaces are numerals from "1" to "48" inclusive. Rigidly secured to the disk 40 is a gear-wheel 41 having fifty teeth. This gear-wheel intermeshes with a pinion 42, mounted on a counter-shaft 43, the pinion having twenty-five teeth. To the counter-shaft is also secured a large gear 44, having one hundred teeth, and this gear intermeshes with a pinion 45, secured to the shaft 11 and having twenty teeth.

The counter-shaft 43 is mounted in bearings supported by a laterally-swinging frame 47, that is pivoted on a pin 48, carried by one of the bearings of the shaft 11, said frame being guided and held from vertical play by a headed stud 48′, extending through a suitable arcuate slot 49 in the frame. One side of this frame is engaged by a spring 50, that tends to throw it to the left for the purpose of holding the teeth of the pinion 45 in mesh with the teeth of the gear 41, and said teeth are always in mesh while the machine is in operation, so that movement from the primary shaft 11 is transmitted through the counter-shaft to the gear 41 and the secondary disk 40.

Secured to the hub of the gear-wheel 41 is the inner end of a spiral spring 52, the outer end of which is firmly secured to the fixed frame. The spring is wound up as the disk 40 turns during the operation of the machine, and when it is desired to restore the disk to zero position a finger lever or bar 53, projecting from the front of the frame, is pushed inward and this bar being connected at its rear end to the swinging frame 47 moves the latter against the stress of the spring 50 and forces the pinion 42 out of mesh with the gear 41, the spring then serving to turn gear 41 and the secondary disk 40 backward to zero position, the parts being stopped in

proper position by the engagement of a pin 55 on gear 41 with an arm 56, that projects from the front portion of the frame.

The gears are so proportioned relatively to each other that one complete revolution of the shaft 11, ratchet-wheels 12 and 29, and primary disk 30 will result in one-tenth of a revolution of the secondary disk 40 on the transfer of ten, and the proper reading of the totals is provided for by a reading indicator 60, which extends over the peripheries of both disks, its lower edge being in alinement with the tops of the numerals representing the correct total.

The reading-indicator 60 is carried by an arm 61, that is pivoted on a pin 62, disposed at a point about diametrically opposite the indicator, and the lower rear end of said arm is acted upon by a spring 63, that tends to move the indicator end of the arm upward and rearward. The inner face of this arm is curved to form a cam 64, that is of a length somewhat greater than one-fifth of the circumference of the ratchet-wheel 29 and terminates at an abrupt shoulder 65. This cam is engaged by a series or pins 66, that are disposed in radial alinement with the blank spaces of the unit-disk 30 and are supported by the disk and by the wheel 29, these pins successively engaging the cam-surface 64 and acting, through the cam, to move the reading-indicator slowly forward and downward, and the speed of movement is equal to the speed of movement of the secondary disk 40, so that, for instance, if the numeral "6" of disk 40 is exposed below the indicator and the numeral "7" is concealed by said indicator said numeral "7" will remain concealed as the indicator travels with said disk 40, and said numeral "7" will not be exposed until the pin 66, then in engagement with the cam-surface 64, passes beyond the abrupt shoulder 65, whereupon the spring 64 will throw the indicator upward and rearward and will expose the previously-concealed numeral "7." During further movement numeral "7" will be exposed or placed in reading position, while the numeral "8" will be concealed until another ten has been added to the units-disk, and by that time another of the pins 66 passes beyond the abrupt shoulder 65, and the indicator again moves upward and rearward to expose the numeral "8."

In using the apparatus the secondary disk 40 may be restored to zero position by shifting the position of the frame 47 and moving the pinion 42 out of mesh with the gear 41, as previously described. When in zero position, the numeral "1" of the secondary disk is concealed by the indicator 60. The units-disk may be turned to a zero position with the character "0" exposed and numeral "1" concealed by turning a small knob 67, projecting from one end of the shaft 11, or by depressing the key-lever that represents a figure the sum of which with the figure indicated on the units-disk will amount to ten.

If the key "5" is depressed, the ratchet-wheel 12 will be rotated to the extent of five teeth through the mechanism previously described, and the primary disk 30 will be turned until the numeral "5" is exposed below the reading-indicator 60. The ratchet-wheel 29 will accomplish this result when turned one-tenth of a revolution, and the disk 30 is likewise turned one-tenth of a revolution; but as there are fifty-five spaces on disk 30 a portion of the numeral "6" would be exposed below the reading-indicator were it not for the fact that one of the pins 66, engaging the cam-surface 64 of the indicator-carrying arm, has moved said arm and carried the indicator slightly forward and downward in order to wholly conceal the numeral "6" and expose only the numeral "5." The one-tenth movement of the shaft 11 moves the counter-shaft one-fifth of that distance, or one-fiftieth of a revolution, and this movement is transmitted through the pinion 42, and gear 41 will move the latter and the secondary disk 40 to the extent of one one-hundredth of a revolution, the numeral "1" of the secondary disk remaining concealed under the reading-indicator 60, which moves at the same speed. If number "5" key is again depressed, the parts referred to will make precisely the same moves as previously described, and this will bring one of the blank spaces between "9" and "0" of two groups of digits of disk 30 to reading position under the indicator 60, while the numeral "1" of the secondary disk still remains under the reading-indicator, and the numeral "0" of the second series of digits of the units-disk also remains under said indicator. At this time, however, a pin 66 is about leaving the shoulder 65, and when it has passed beyond the end of the shoulder the arm 61 is actuated by the spring 63, and the reading-indicator is thrown upward and rearward to the extent of a single numeral-space, exposing the previously-concealed numeral "1" of the secondary disk and the character "0" of the units-disk, thereby placing the correct total of five plus five in position under said reading-indicator.

With a device of this kind it is obvious that by following the lower side of the reading-indicator the correct total will be in view at all times and that no confusion can arise from the continuous slow rotation of the secondary disk.

I claim—

1. In a machine of the class described, primary and secondary totaling-disks, a key-actuated means for imparting movement to the primary disk, a transfer mechanism through which continuous movement is imparted to the secondary disk during movement of the

primary disk, a reading-indicator extending over both disks and means for actuating the same at a speed corresponding to the speed of movement of the secondary disk to conceal an advancing numeral until the passage of decimals of the primary disk, and then permitting movement of said reading-indicator to expose the concealed numeral.

2. In a machine of the class described, primary and secondary totaling-disks, means for moving the primary disk a transfer mechanism through which movement of the primary disks is continuously imparted to the secondary disk, and a reading-indicator extending over both disks and arranged to conceal an advancing numeral of the secondary disk until movement of the primary disk beyond a decimal indication.

3. In a machine of the class described, totaling-disks including a primary disk and a secondary disk, of which the secondary disk is arranged to receive continuous movement during the movement of the primary disk and at a slower speed than the latter, and a reading-indicator extending over both disks and shielding the successive numerals of the secondary disk until a transfer is to occur.

4. In a machine of the class described, a primary disk, and a secondary disk, a key-actuated mechanism for imparting movement to the primary disk, gearing connections for continuously transmitting the movement of the primary disk to the secondary disk at a reduced speed, and a reading-indicator extending over both disks and shielding the successively-advancing numerals of the secondary disk until the primary disk has advanced to indicate a total of ten or more than ten.

5. In an adding-machine, numeral-bearing members representing lower and higher values, respectively, means for actuating the member of lower value, means for continuously transmitting at reduced speed the movement of the member of lower value to the member of higher value, and means for concealing the successive numerals of the member of higher value until the member of lower value has moved to a predetermined extent.

6. In a machine of the class described, primary and secondary totaling-disks, a supporting-shaft to which the primary disk is secured, a ratchet-wheel also secured to the shaft, a pawl-carrying lever, a pawl supported thereby and engaging the ratchet-wheel, a key actuated means for operating the lever, a pinion also secured to the shaft, a secondary disk, and a gear-wheel having an axis of rotation coincident with that of said shaft, a counter-shaft, a gear, a pinion secured to the counter-shaft, the gear intermeshing with the pinion of the first shaft, and a pinion of the counter-shaft intermeshing with the gear of the secondary disk.

7. In a machine of the class described, a primary totaling-disk, a shaft to which said disk is secured, a ratchet-wheel and a pinion rigidly secured to said shaft, a pawl, a carrying-lever pivoted on the shaft, a spring carried by the lever and engaging the ratchet-wheel, a spring for restoring the lever to initial position, key-actuated mechanism for imparting movement to said lever, a counter-shaft, a gear carried thereby and intermeshing with the pinion, a secondary totaling-disk, and a gear mounted loosely on the main shaft, and a pinion secured to the counter-shaft and intermeshing with the gear of the secondary disk.

8. In a machine of the class described, a primary disk, a main shaft to which said disk is secured, a ratchet-wheel, and a pinion rigidly secured to said shaft, a spring-returned lever pivoted on the shaft, a pawl carried by the lever and engaging the ratchet-wheel, a key-actuated means for imparting movement to the levers, a secondary disk, and a gear free to rotate on the main shaft, a movable frame, a counter-shaft supported by the movable frame and gear, a pinion carried by the counter-shaft, the gear intermeshing with the pinion of the main shaft, and the pinion of the counter-shaft meshing with the gear of the secondary disk.

9. In a machine of the class described, the combination with a primary disk, of a shaft carrying the same, a ratchet-wheel and a pinion secured to the shaft, a spring-returned lever pivoted on the shaft, a pawl carried by said lever and engaging the ratchet-wheel, and key-actuated means for imparting movement to the lever, a second disk, and a gear mounted loosely on the main shaft, a spring tending to restore said secondary disk and its gear to zero position, interengaging stop members for stopping the disk and gear at zero position, a movable frame, an operating-bar connected thereto, a counter-shaft supported by the frame, and gears carried by the counter-shaft for transmitting movement of the main shaft-pinion to the gear of the secondary disk, said frame being movable to disconnect the train of gears and permit return of the secondary disk to zero position.

10. In a machine of the class described, a totaling-disk having a series of spaced grooves of numerals from naught to nine inclusive, the space between each group corresponding to the space occupied by any one numeral, a reading-indicator, means for moving the same in the direction in which the disk rotates but at a speed less than the speed of said disk, and for permitting rearward movement of said indicator across the blank spaces at the completion of each movement of the disk to the value of ten.

11. In a machine of the class described, a primary and a secondary totaling-disk, of which the primary disk has numerals ar-

ranged in spaced groups, each group including numerals from naught to nine, and the secondary disk having numerals indicating values in tens or higher, means for imparting movement to the primary disk, means for transmitting the movement of the primary disk continuously to the secondary disk at reduced speed, a reading-indicator extending over both disks, means for advancing said reading-indicator in the direction of rotation of the disks and at a speed corresponding to that of the secondary disk, and means for permitting rearward movement of said indicator to the extent of a single space at the completion of each movement of the primary disk to a total of ten or more.

12. In a machine of the class described, a ratchet-wheel having an even number of teeth representing any multiple of ten, an indicating-disk connected to said ratchet-wheel and bearing groups of numerals from naught to nine, inclusive, there being as many groups of numerals as there are multiples of ten on the ratchet-wheel teeth, there being a blank space between each group of numerals, a pawl engaging said ratchet-wheel, a key-actuated means for operating the pawl, and a reading-indicator arranged over the disk and receiving movement at a speed less than that of said disk, and means for permitting a backward step of the indicator after each movement of the disk to the value of ten or more than ten.

13. In a machine of the class described, the combination with primary and secondary totaling-disks, of a key-actuated means for imparting movement to the primary disk, means for continuously transmitting the movement of the primary disk to the secondary disk, a reading-indicator extending over the periphery of the disk, a pivotally-mounted arm carrying the reading-indicator and provided with a curved cam-disk terminating at an abrupt shoulder, and pins or lugs projecting from the primary disk and engaging said cam-disk to impart movement to the reading-indicator at a speed corresponding to the speed of movement of the secondary disk, the passage of each pin or lug beyond the shoulder permitting a backward step of said reading-indicator.

14. In a machine of the class described, the combination with primary and secondary disks, of a key-actuated means for imparting movement to the primary disk, means for continuously transmitting movement of the primary disk to the secondary disk, a reading-indicator extending across the peripheries of the disks, a pivotally-mounted spring-engaged arm carrying the reading-indicator and provided with a curved cam-face terminating in an abrupt shoulder, a series of pins or lugs extending from the primary disk and arranged to engage said cam-face to impart to the reading-indicator a movement at a speed corresponding to that of the secondary disk, the passage of each pin or lug beyond the shoulder permitting a backward step of the reading-indicator to the extent of a single space.

15. In a machine of the class described, the combination with totaling or indicating disks, of key-actuated levers through which movement is imparted to the disks, a locking-wheel movable with one of the disks, a stop-pawl for engaging said locking-lever, a pivotally-mounted bar carrying the pawl and arranged under the entire series of key-levers, and adjustable stop-strips carried by said bar and with which the key-levers engage to effect movement of the stop-pawl.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

STEPHEN H. DRYSDALE.

Witnesses:

EDWIN S. CLINE,

JACOB S. EARNEST.