

R. A. GRABER.
 ADDING MACHINE.
 APPLICATION FILED DEC. 7, 1910.

1,002,262.

Patented Sept. 5, 1911.

2 SHEETS—SHEET 1.

Fig. 1.

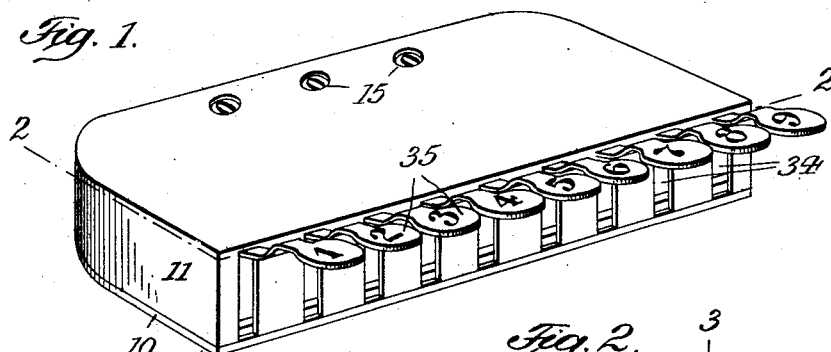


Fig. 2.

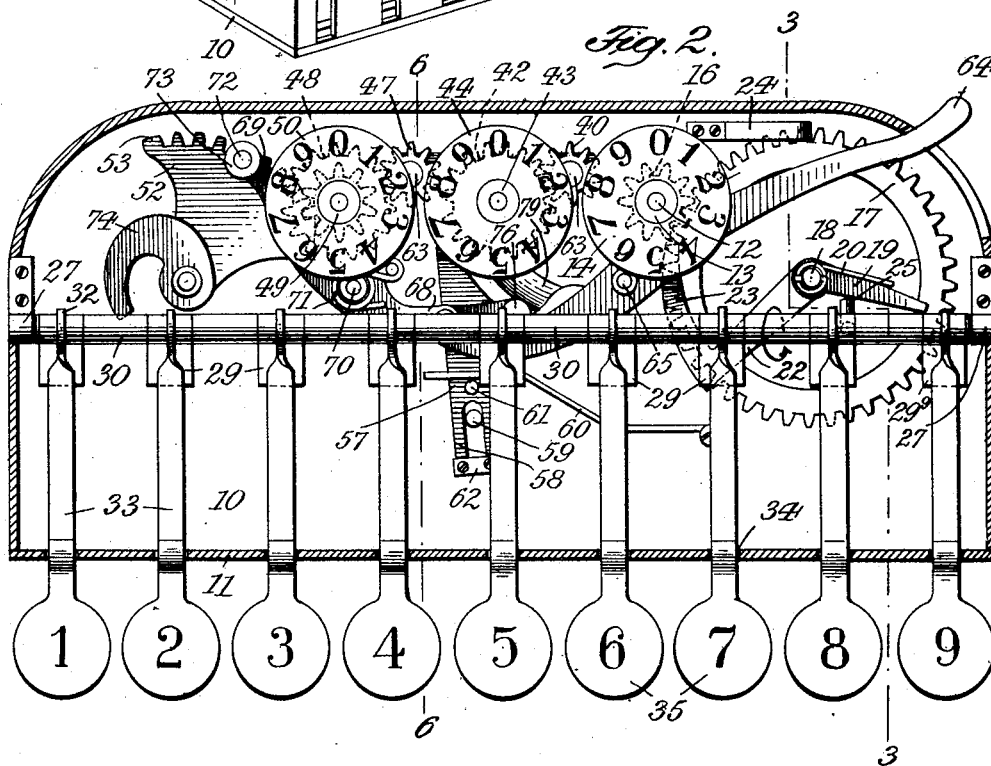


Fig. 3.

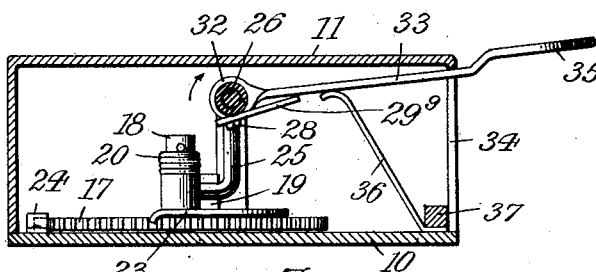
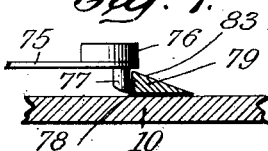


Fig. 7.



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2 SHEETS—SHEET 2.

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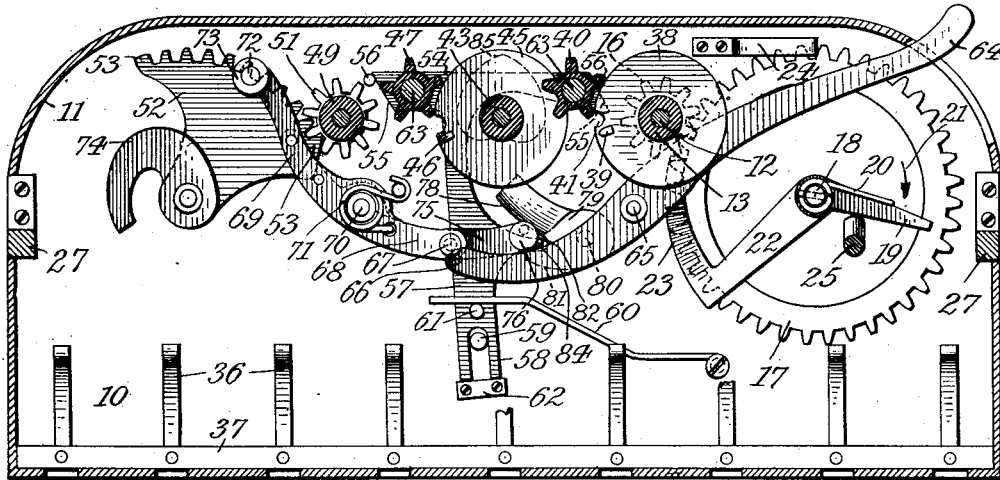


Fig. 4.

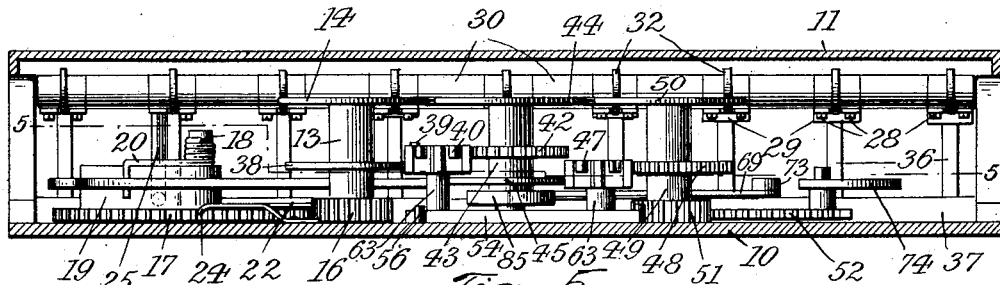


Fig. 5.

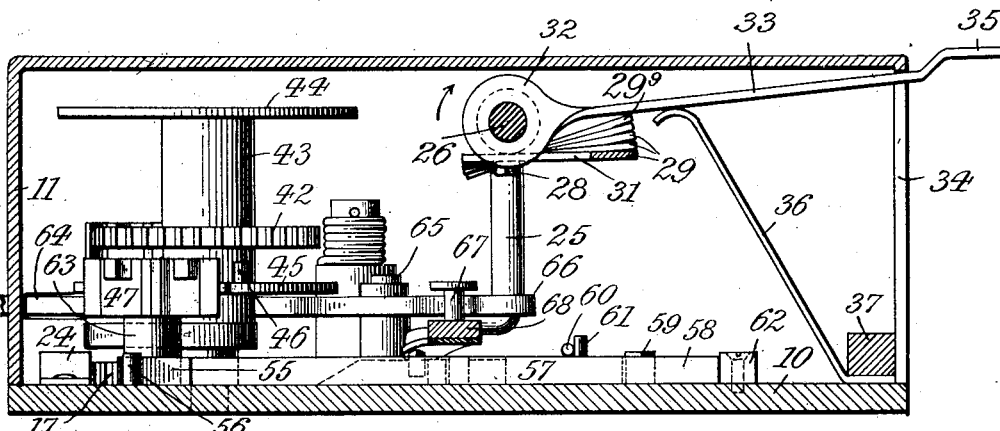


Fig. 6.

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UNITED STATES PATENT OFFICE.

ROBERT ALBERT GRABER, OF NEW YORK, N. Y.

ADDING-MACHINE.

1,002,262.

Specification of Letters Patent.

Patented Sept. 5, 1911.

Application filed December 7, 1910. Serial No. 596,000.

To all whom it may concern:

Be it known that I, ROBERT ALBERT GRABER, a citizen of the United States, residing at New York city, borough of the Bronx, county of New York, and State of New York, have invented a new and Improved Adding-Machine, of which the following is a specification.

This invention relates to an adding machine of novel construction which is more particularly adapted for consecutively computing the sums of the units, tens, hundreds, etc., of a row of figures.

Briefly stated the machine comprises nine keys indexed 1-9 which are adapted to correspondingly advance a units-registering disk. The latter is normally coupled to a pair of disks which register the tens and hundreds, according to the number of revolutions of the units disk. The latter, however, is automatically uncoupled from the tens and hundreds disks, while they are returned to their zero position. The machine is compact, of simple construction and may be readily manipulated.

In the accompanying drawing: Figure 1 is a perspective view of my improved adding machine; Fig. 2 a horizontal section on line 2-2, Fig. 1; Fig. 3 a cross section on line 3-3, Fig. 2; Fig. 4 a horizontal section on line 5-5, Fig. 5; Fig. 5 a sectional rear view of the machine; Fig. 6 an enlarged cross section on line 6-6, Fig. 2, and Fig. 7 a detail of the dog and adjoining parts.

From the bottom plate 10 of a suitable casing 11 rises a vertical pin 12 upon which is freely rotatable the sleeve or hub 13 of the units dial 14. The latter is provided with the digits 0 to 9, the rear digit being displayed through a window 15 of casing 11. To sleeve 13 is secured a pinion 16 having 10 teeth which mesh into a toothed wheel 17 turning on a fixed stud 18 of bottom 10. Upon stud 18 is also free to turn an elbow lever, one arm 19 of which is influenced by a spring 20 tending to rotate the arm in the direction of arrow 21 (Fig. 4). The other arm 22 of the elbow lever is provided with a curved spring pawl 23, the free end of which enters the teeth of wheel 17 and is adapted to rotate the latter in the direction of arrow 21. During the receding movement of spring pawl 23, a spring-detent 24 maintains gear wheel 17 in the position to which it has previously been set. Against arm 19 impinges the bent end of a rod or

finger 25 depending from and secured to a longitudinal shaft 26 that turns in bearings 27 of plate 10. It will thus be seen that when shaft 26 is turned in the direction of the arrow (Figs. 2 and 3) lever 25 will partially rotate wheel 17 through double lever 19, 22 and pawl 23 thereby tightening spring 20, while upon the return of said shaft, spring 20 will unwind to return lever 19, 22 to its original position, wheel 17, however, being held against return by detent 24.

To shaft 26 are secured by screws 28, nine tappets 29 separated from each other by spacing tubes 30. Each tappet 29 is provided with a central slot 31 accommodating the eye 32 of a key lever 33, said eye loosely encircling shaft 26. Levers 33 pass through vertical slots 34 of casing 11 and carry finger pieces 35 numbered from 1 to 9. Springs 36 tend to raise levers 33 into engagement with the upper ends of slots 34, while a longitudinal bar 37 limits the downstroke of the levers. Tappets 29 are set at different angles to their respective key levers 33, the tappet 29 of the key lever numbered 9 being so arranged that its forward end contacts with such lever (Fig. 3), while the angle between tappets and levers increases gradually toward the left. In this way the key levers swing idly through a greater or less arc before they abut against their tappets to take them along during the continued descent, thereby turning shaft 26 through a smaller or greater angle. The actual proportions are such that when, for instance key lever "1" is depressed, its tappet 29 will rotate shaft 26 through such an angle that pawl 23 advances wheel 17 for one tooth, while when key lever "2" is depressed, wheel 17 is advanced for two teeth, and so on.

Upon sleeve 13 is mounted a disk 38 having a pin 39 which is adapted to engage the teeth of a pinion 40 having ten teeth. At the lower portion of the pinion and opposite disk 38, five alternating teeth are cut away as illustrated in Fig. 5, so that the rotating disk 38 by engaging a pair of adjoining uncut teeth, locks pinion 40 in position, the whole constituting a Geneva movement (Fig. 4). Flanking pin 39, disk 38 has a notch 41 that permits the passage of one of the uncut teeth of pinion 40 when the latter is partially rotated by pin 39. The upper unmutilated portion of pinion 40 meshes with a

toothed wheel 42 having twenty teeth and fast on the hub 43 of a dial 44, which is provided with the digits 0 to 9. Hub 43 carries a disk 45 having a pin 46 which is adapted to engage a partly mutilated pinion 47, the parts 45, 46 and 47 being in all respects duplicates of the parts 38, 39, 40. Pinion 47 engages a toothed wheel 48 having twenty teeth and fast on the hub 49 of a dial 50 which is also provided with the digits 0 to 9.

As thus far described, the manipulation is as follows: If a column of figures containing any number of digits is to be added, all the units are first added by depressing the corresponding finger pieces 35. So for instance a depression of key "9" will advance wheel 17 for nine teeth and consequently the intergeared dial 14 for nine digits. Upon the release of the key, the latter will be raised by spring 36, while elbow lever 19, 22 will be returned by spring 20. During this return movement of the parts 36, 19, 22, wheel 17 will be retained in its position by detent 24, so that dial 14 will be maintained in the position to which it has been set. During the consecutive depression of finger pieces 35, the sum of the corresponding digits will be registered by dials 14, 44, 50, the carrying of the tens and hundreds being effected by the pins 39, 46 and coöperating parts, as will be readily understood. After all the units have thus been added, the digit of dial 14 displayed through window 15 is noted, and the tens and hundreds are also noted. Dials 44, 50 are now returned to their zero position, while dial 14 remains at the position to which it has been set, as hereinafter more fully described. The complement number is now added to the remaining digit of dial 14 by depressing corresponding finger pieces 35 so as to display the digit or digits of the figure to be carried, whereupon the operation is repeated for adding the digits of the tens-column, etc. Thus if for instance the sum of the numbers 997, 458, 759, 898 is to be computed the digits of the numbers are first added by consecutively depressing the keys "7", "8", "9", "8" to display the sum of "32" through two right hand windows 15. The numeral "2" is noted as constituting the digit of the sum, whereupon the tens-dial is returned to its zero position, while the digit "2" remains exposed. As "3" is to be carried the key "1" is depressed thereby changing "2" previously displayed through right hand window 15 into "3". The tens of the numbers are now added to the three already displayed by consecutively depressing keys "9", "5", "5", "9" to display the sum of "31" through the two right hand windows 15, whereupon "1" is placed in front of the digit "2" previously ascertained. The tens dial is now again returned to its zero position while the numeral "1"

remains displayed, but as "3" is to be carried, key "2" is depressed, whereupon the keys "9", "4", "7", "8" are consecutively depressed to compute the sum of the hundreds. In this way "31" will be displayed, which sum is written in front of the number 12 previously ascertained, thereby bringing the total up to 3112, which represents the desired sum.

The means for returning dials 44, 50 to their zero position are as follows: The hub 49 of dial 50 is provided with a fixed pinion 51 having ten teeth meshing into a sector 52 having nine teeth of normal cross section and a pair of comparatively wide flanking teeth 53 which cannot enter the recesses between the teeth of pinion 51 and thus constitute stops therefor. Upon the bottom 10 is supported a T-shaped slide movable at right angles to the axes of dials 44, 50, the cross bar 54 of said slide being provided with parallel bevels 55 guided between fixed pins 56. The stem 57 of the slide is forked as at 58 for the reception of a stationary pin 59. A spring 60 engaging an abutment 61 of stem 57 tends to draw the latter against a fixed stop 62. Bar 54 carries a pair of studs 63 that constitute the fulcrums for pinions 40 and 47. For moving slide 54, 57, a handle 64 is pivoted to plate 10 as at 65 and is provided with a tail 66. This tail engages a pin 67 of a two arm lever 68, 69 pivoted at 70 to plate 10. Lever 68, 69 is normally held in the position indicated in Fig. 4 by a spring 71 coiled around pivot 70. Arm 69 carries a pin 72 provided with an antifriction roller 73 which is adapted to engage a cam 74 secured to sector 52. To the lower side of lever arm 68 is secured a resilient member 75 carrying an upper knob 76 and a lower pin 77 which latter is adapted to engage the curved back 78 of a dog 79 pivoted at 80 and having a finger 81 as well as an intervening recess 82, the dog being beveled as at 83 for a purpose hereinafter described. Into recess 82 extends a laterally projecting arm 84 of stem 57 that returns the dog after operation to its original position. Knob 76 is adapted to engage a cordate cam 85 mounted on the hub 43 of dial 44. If it is desired to return dials 44, 50 to their zero position, handle 64 is swung forward, to tilt backward through tail 66 and pin 77 the arm 68 of lever 68, 69. The receding pin 77 of arm 68 while riding along the back 78 of dog 79 will tilt the latter whereby slide 54, 57 is shifted backward owing to the engagement of finger 81 with arm 84. In this way the studs 63 of pinions 40 and 47 are moved rearward and to the left so as to withdraw said pinions from disks 38, 45 while they remain in engagement with toothed wheels 42, 48 respectively. During the continued rearward motion of arm 68, knob 76 engages cam 85 and

thereby turns dial 44 until its zero number appears below window 15. Simultaneously therewith roller 72 has been swung forward to engage cam 74 and thus return dial 50 to its zero position. Immediately before handle 64 and lever 68, 69 reach their terminal position, pin 77 slips off dog 79 so as to permit spring 60 to return slide 54, 57 to its initial position and recouple pinions 40, 47 with their respective disks. After handle 64 has been released by the operator, spring 71 returns lever 68, 69 and handle 64 to their original position during which movement the resiliency of member 75 permits pin 77 to ride over the incline 83 of dog 79 until it engages the back 78 of dog 79. The machine is thus ready for the next operation.

I claim:

1. An adding machine comprising a shaft, slotted tappets secured thereto at different angles, spring-influenced key levers loosely mounted on the shaft and accommodated by the tappet-slots, said levers being adapted to engage the tappets, and a registering device operatively connected to the shaft.

2. An adding machine comprising a pair of pinions alternating teeth of which are partly mutilated, toothed wheels engaged by the unmutilated pinion-sections, notched disks adapted to be engaged by the mutilated pinion sections, and means for withdrawing the pinions from the disks while maintaining their engagement with the toothed wheels.

3. An adding machine comprising a pair of rotatable hubs, dials and toothed wheels secured thereto, a first cam on one of said hubs, a second cam intergeared with the other hub, pinions engaging the toothed wheels, a slide carrying the pinions, a two arm lever adapted to engage both cams, and means for simultaneously reciprocating the slide and oscillating the lever.

4. An adding machine comprising a pair of rotatable hubs, dials and toothed wheels secured thereto, a first cam on one of said hubs, a second cam intergeared with the other hub, pinions engaging the toothed wheels, a slide carrying the pinions, a two-arm lever, a knob on one arm of said lever adapted to engage the first cam, a pin on the other lever-arm adapted to engage the second cam, and means for simultaneously re-

ciprocating the slide and oscillating the lever.

5. An adding machine comprising a pair of rotatable hubs, dials and toothed wheels secured thereto, a first cam on one of said hubs, a second cam intergeared with the other hub, pinions engaging the toothed wheels, a spring-influenced T-shaped slide having a beveled cross bar and a forked stem, fixed pins engaging the cross bar-bevels and the stem, an arm on said stem, a recessed pivoted dog engaged by said arm, a two arm lever adapted to engage said first and second cams and the dog, and a handle operatively connected to said lever.

6. An adding machine comprising a pair of dials, toothed wheels secured thereto, pinions adapted to engage said wheels, a spring-influenced T-shaped slide composed of a pinion-carrying cross bar and of a stem, means for guiding said slide, an arm projecting laterally from the stem, a pivoted beveled dog having a recess that is engaged by said arm, a two-arm lever, a resilient member on one arm of said lever, a pin carried by said member which is adapted to engage the beveled dog, and a handle operatively connected to said lever.

7. An adding machine comprising a pair of pinions alternating teeth of which are partly mutilated, toothed wheels engaged by the unmutilated pinion-sections, notched disks adapted to be engaged by the mutilated pinion-sections, a slide carrying the pinions, and means for so moving said slide as to withdraw the pinions from the disks, while maintaining their engagement with the toothed wheels.

8. An adding machine comprising a pair of partly mutilated pinions, toothed wheels engaged by the unmutilated pinion-sections, notched disks adapted to be engaged by the mutilated pinion sections, a T-shaped slide carrying the pinions and having parallel bevels, stationary pins engaged by the bevels, and means for advancing the slide, whereby the pinions are withdrawn from the disks while maintaining their engagement with the toothed wheels.

ROBERT ALBERT GRABER.

Witnesses:

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KATHERYNE KOCH.