No. 808,893. PATENTED JAN. 2, 1906.

E. R. BEACH.

ADDING MACHINE.

APPLICATION FILED MAR. 28, 1905.

Fig. 1.

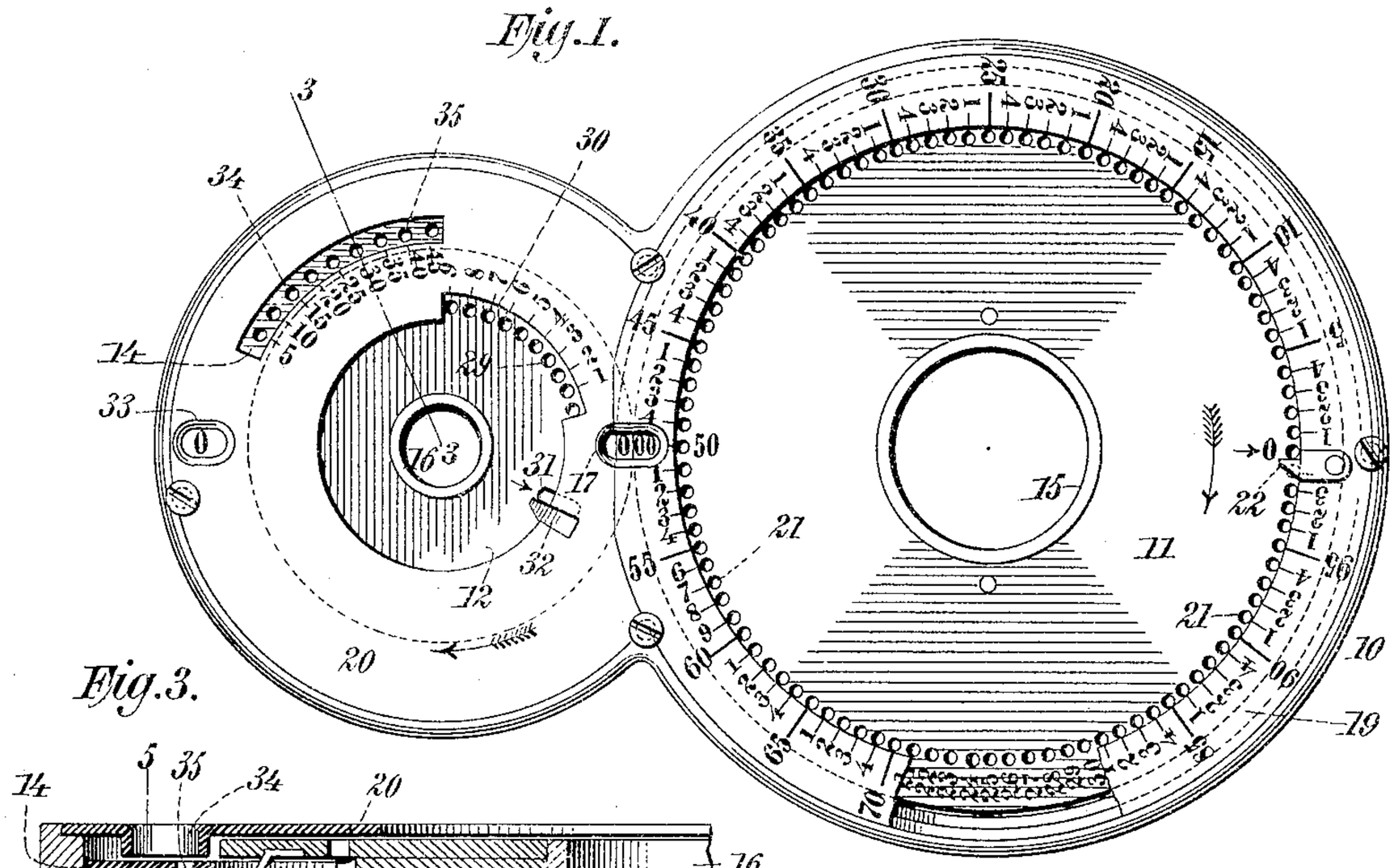


Fig. 3.

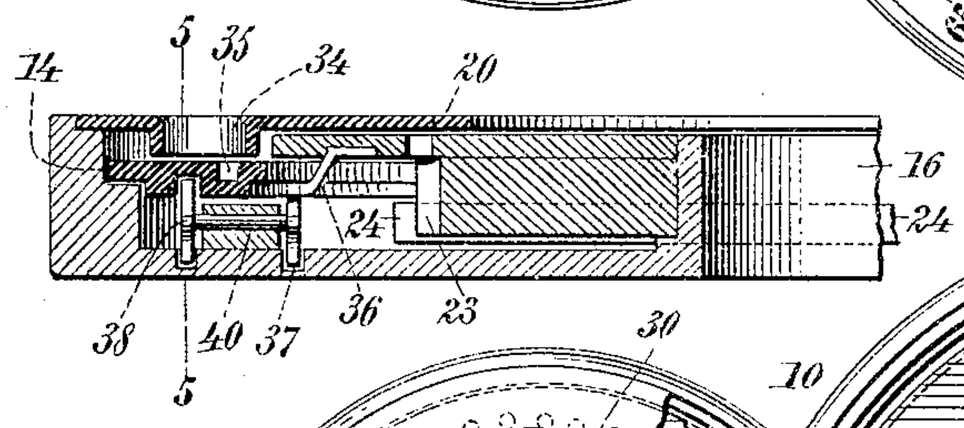


Fig. 2.

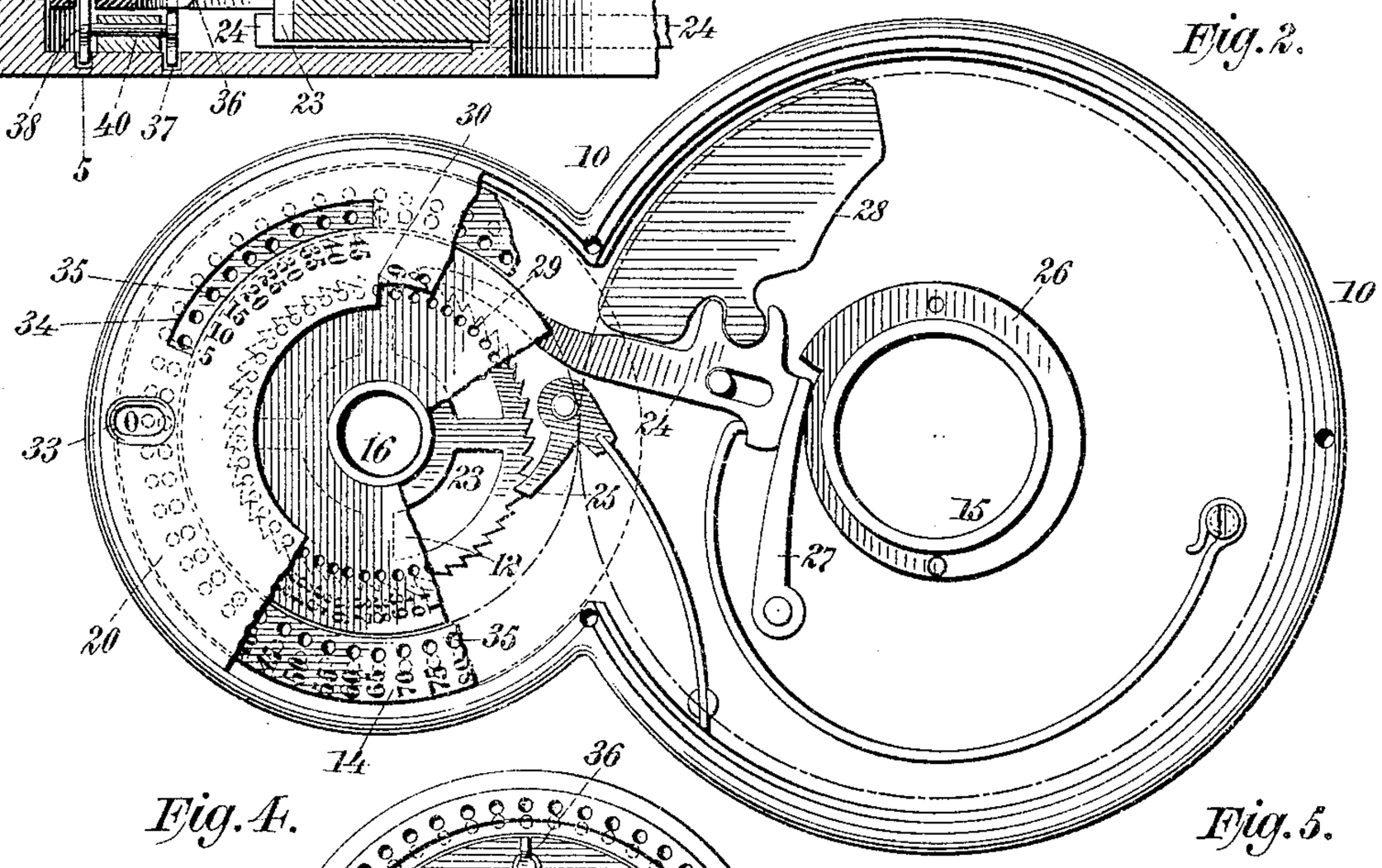
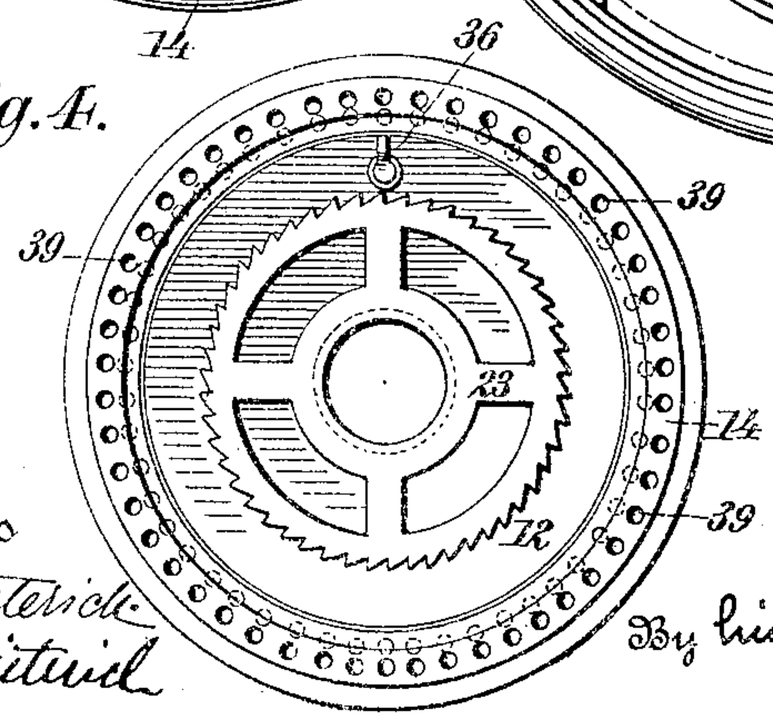
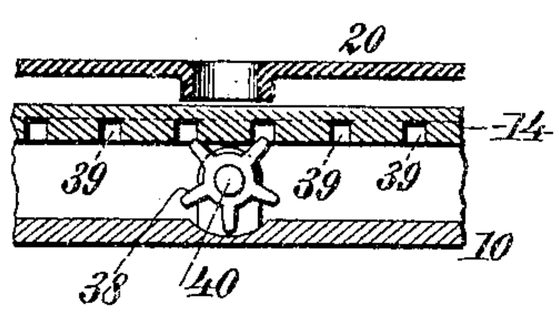


Fig. 4.

Fig. 5.





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UNITED STATES PATENT OFFICE.

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ADDING-MACHINE.

No. 808,893. Specification of Letters Patent. Patented Jan. 2, 1906.

Application filed March 28, 1905. Serial No. 252,470.

To all whom it may concern:

Be it known that I, EDWIN R. BEACH, a citizen of the United States, and a resident of Jersey City, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Adding-Machines, of which the following is a specification.

The invention relates to improvements in adding-machines; and it consists in the novel features and combinations of parts hereinafter described, and particularly pointed out in the claims.

The invention pertains more particularly to improvements in the character of adding-machines shown and described in Letters Patent of the United States No. 414,335, granted November 5, 1889, to Lester C. Smith, and I have in the accompanying drawings illustrated my invention as applied to or added in the machine shown in the said patent. The machine of the said Patent No. 414,335 comprises as its essential features two rotating disks or dials, one of which bears the "unit" and "ten" numerals and the other the "hundred-numerals," the latter disk being driven from the former through the medium of suitable intermediate mechanism. In the machine of the said patent the "unit" and "ten" disk bears in consecutive order numerals ranging from "1" to "100," the latter being represented by two ciphers—thus, "00"—and at each complete rotation of this disk the hundred-disk is moved one space to carry one of its numerals to an exposed position in line with the then exposed numerals of the unit and ten disk, so that the sum may be read through an opening at the adjoining edges of the two disks. The hundred-disk bears the numerals from "1" to "50," the latter being represented by a cipher—thus, "0"—this cipher appearing at the end of each rotation of the hundred-disk and while bringing the said disk back to zero, indicating to the user that the said disk registers "5,000."

Considerable difficulty has been experienced in connection with the machine of the aforesaid patent by reason of the fact that in adding up large amounts above six thousand the user of the machine must either remember how many rotations the hundred dial or disk has made or make a memorandum of the same each time the said dial completes a rotation, and this necessity for either remembering the number of rotations of the hundred-dial or keeping a tally of the same is a matter of serious consequence, because of the danger of mistake due to forgetfulness or a failure to accurately tally the rotations made by the hundred-dial.

The object of my invention is to dispense with any necessity for remembering the number of rotations made by the hundred-dial or of keeping a written record of the same and to provide an adding-machine in which may be preserved the desirable features of the aforesaid patented machine and which may be employed for counting to an almost unlimited sum, the machine illustrated in the drawings forming a part of this application being capable of adding and denoting at the reading-openings up to two hundred and fifty-four thousand nine hundred and ninety-nine.

The invention will be fully understood from the detailed description hereinafter presented, reference being had to the accompanying drawings, in which—

Figure 1 is a top view, partly broken away, of an adding-machine constructed in accordance with and embodying the invention. Fig. 2 is a top view, partly broken away, of same, the unit and ten dial and the numbered fixed ring surrounding the same being removed. Fig. 3 is an enlarged sectional view of a portion of same on the dotted line 3 3 of Fig. 1. Fig. 4 is a detached bottom view of the hundred-dial with the ring-dial surrounding the same, on which the adding may be carried on up to two hundred and fifty thousand; and Fig. 5 is a detached vertical section on the arc of a circle on the dotted line 5 5 of Fig. 3.

In the drawings, 10 designates the general casing of the machine; 11, the unit and ten dial; 12, the hundred-dial; and 14 the ring-dial encircling the dial 12, and which is a new feature in the machine. The dials 11 12 are mounted on the hollow journals 15 16, respectively, as usual, and with their peripheries nearly in contact at a reading-opening 17, formed in adjacent portions of a fixed ring-dial 19 and fixed plate 20, said ring-dial 19 being secured to the casing 10 and covering the outer edge portions of the dial 11, while the plate 20 is secured to the casing 10 and is over the dial 12 and rotary ring dial 14.

The dial 11 is stamped or marked with unit and ten numerals from "1" to "100" in regular consecutive order, as usual, the one hundred being denoted by two ciphers, thus: "00," and adjacent to the line of said numerals the dial 11 is formed with a series of one hundred perforations 21, arranged in a

circle and so as to stand close to the inner edge of the fixed ring dial or plate 19, which ring dial or plate 19 bears a series of one hundred numbered graduation-marks. The dial 11 during the counting is operated by the insertion of a stylus in the proper perforations 21 therein and the movement of said stylus until it reaches the fixed stop 22 in a familiar manner. There are no new features connected with the dial 11 or fixed ring dial or plate 19.

The hundred-dial 12 bears a series of numerals ranging from "1" to "50" in regular consecutive order, the fifty denoted by an individual cipher, and this dial 12 has secured to its lower face a ratchet-wheel 23, which is engaged by a spring draw-pawl 24 and spring-dog 25, and the said pawl 24 is adapted to each rotation of the dial 11 to impart a limited rotary movement, equal to one tooth of the ratchet 23 to the dial 12, the said pawl receiving its movement from a volute cam 26, carried by the dial 11 and coöperating with a pivoted arm 27 and hammer 28, all as fully shown and described in the aforesaid Letters Patent. The volute cam 26, arm 27, spring-pawl 24, hammer 28, dog 25, and ratchet 23 constitute convenient mechanism for transmitting motion from the dial 11 to the dial 12, and these devices require no special description, since they are all disclosed for a like purpose in the aforesaid Letters Patent. During the rotation of the dial 11 its numerals are carried by the reading-opening 17, and on any rotation of the dial 12 its numerals are carried by the said reading-opening, so that upon the cessation of any movement of the said dials the sum denoted thereon may be read at the opening 17. The dial 12 is formed with the series of apertures 29 to receive the stylus when it is desired to independently rotate the said dial 12, as when hundreds are to be added, and along one edge of the opening at the center of the stationary plate 20 is formed a recess 30 for exposing a series of said apertures 29, and the plate 20 along the edge of the said recess bears a series of numbered graduation-marks to guide the operator in rotating the dial 12, each of said graduation-marks denoting one hundred. The dial 12 is also formed with an aperture 31, by means of which, in connection with a stylus, the dial may be at one movement returned to zero, which is the position in which it is illustrated in Fig. 1, the stylus, upon the dial 12 reaching a zero position, coming up against a stop 32, and the cipher on the dial 12 becoming arrested at the reading-opening 17.

It will be understood that the dial 11 is employed exclusively for adding units and tens, the sum of this addition being disclosed at the reading-opening 17, and that with each rotation of the dial 11 the dial 12 is moved a space equal to one of the teeth of the ratchet-wheel 23, so as to bring one of its numerals at the reading-opening 17. Thus upon the dial 11 completing one rotation and bringing its two ciphers to the reading-opening 17 the dial 12 will turn one predetermined space and bring the numeral "1" thereon to the reading-opening 17, thus disclosing at said opening "100." If, in the further operation, it should be desired to add two hundred and fifty to the one hundred already denoted, the operator will insert the stylus at the "50" aperture 21 and rotate the dial 11 until the numeral "50" thereon appears at the reading-opening 17, and then he will with the stylus engage the aperture 29 of the dial 12 opposite to the "2" graduation-mark on the plate 20 and rotate the said dial until the stylus reaches the lower end of the recess 30, thereby rotating the dial 12 a distance equal to two spaces and causing the latter to display at that time the numeral "3" at the opening 17, while the dial 11 discloses the numeral "50" at said opening. With each complete rotation of the dial 11 the latter returns to its zero position, and at each complete rotation of the dial 12 the latter returns to its zero position, disclosing an individual cipher at the reading-opening 17, this cipher denoting five thousand. If the amount to be added reaches above six thousand, the operator must, in the machine of the aforesaid patent, remember that the dial 12 has made a rotation or make a written memorandum of the same, since the capacity of the disk 12 is limited to five thousand.

The operation above described with respect to the dials 11 12 is representative of the prior art, and my invention has to do with means for increasing the capacity of the machine to, say, two hundred and fifty-four thousand nine hundred and ninety-nine and of obviating the necessity of remembering or recording the number of rotations made by the dial 12.

The rotary ring-dial 14 encompasses the hundred-dial 12 and is seated upon a shoulder formed in the vertical wall of the machine, as indicated in Fig. 3, said dial 14 being covered by the plate 20, except at the reading-opening 33 and slot 34. The dial 14 bears "thousand" numerals ranging in multiples of five from "5" up in regular consecutive order, the "5" denoting five thousand and the final cipher or return to zero, two hundred and fifty thousand. The dial 14 is formed with the series of apertures 35 to receive the operating-stylus when necessary, and the numerals on said dial are adapted to pass below the reading-opening 33 in the plate 20, the first of said numerals being a cipher, denoting either that the dial 14 is at its initial zero position or has completed a rotation, when said cipher will represent two hundred and fifty thousand. With each complete rotation of the dial 12 an addition of five thousand will have been made, and hence the numerals on the dial 14 are arranged in multiples of five, be-

cause the dial 14 is to register the rotations of the dial 12 and denote the total sum of such rotations. Thus when the dial 12 has made one rotation, representing an addition of five thousand, the ring-dial 14 will move one space and present at the reading-opening 33 the numeral "5," and when the dial 12 is completing a second rotation the ring-dial 14 will move another space and register "10" at the reading-opening 33, thus denoting ten thousand, and so on, the ring-dial 14 moving one space and adding five thousand to be observed at the reading-opening 33 with every rotation of the dial 12. When all of the amounts shall have been added on the machine, the operator will find the total sum by reading the numerals exposed at the reading-openings 33 17.

The ring-dial 14 receives its motion from the dial 12, the latter being provided upon its lower surface with a finger 36, which at each rotation of the dial will engage a star-wheel 37 and by turning the same one tooth operate a corresponding and connected star-wheel 38, whose teeth or arms engage equally-spaced recesses 39, formed in the lower side of the dial 14. At each rotation of the dial 12 the arm 36, operating through the star-wheels 37 38, rotates the dial 14 a distance equal to one space, so as to bring the succeeding numeral to an exposed position at the opening 33. The star-wheels 37 38 are secured upon a small shaft 40 and have corresponding movement and they, with the arm 36, constitute the means for imparting intermittent motion from the disk-dial 12 to the ring-dial 14.

An occasion may arise when it may be desired to add even five thousands to the previously-added amounts without operating the dials 11 12, and on any such occasion the ring-dial 14 may be independently operated by means of a stylus in connection with the apertures 35, exposed at the slot 34 in the plate 20, the space between each two of the apertures 35 denoting five thousand.

In referring to the operation of the machine it will be unnecessary to repeat what has been said in regard to the manner of utilizing the disk-dials 11 12, and the operation of the ring-dial 14 will doubtless be understood from the explanation hereinbefore given in relation to the same. The dial 12 makes a complete rotation with every five thousand added, and in accordance with my invention these multiples of five are taken care of by the ring-dial 14, which exposes the total amount added on it at the reading-opening 33 and moves one space with each complete rotation of the dial 12. The ring-dial 14 receives its step-by-step movements from the dial 12 through the arm 36 and star-wheels 37 38; but when it is desired to add any number of thousands in multiples of five directly upon the ring-dial 14 this may be accomplished by operating the dial 14 direct (through the slot 34) without disturbing or operating the dials 11 12.

My invention therefore increases the capacity and utility of the adding-machine by conveniently enabling the adding of an amount far in excess of five thousand, which is the limit of the dial 12, the machine shown being capable of adding on the ring-dial 14 alone two hundred and fifty thousand.

The final reading of the total sum added will be from both the reading-openings 33 and 17, the opening 33 disclosing the thousands amount represented in multiples of five thousand, and the opening 17 disclosing the units of thousands and hundreds amount on the dial 12, and the tens and units amount on the dial 11. Thus if the numeral "70" appeared at the opening 33 and "1500" appeared at the opening 17 the total represented would be "71500."

My invention therefore very greatly increases the capacity of the adding-machine at a very slightly-increased expense of manufacture and without unduly adding to the size or complication of the machine.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In an adding-machine, the rotatively-mounted units and tens dial bearing the line of numerals along its outer edge and having the series of apertures adjacent thereto, to receive a stylus for rotating said dial, the fixed ring-dial over the outer portion of said rotary disk-dial and bearing numbered graduation-marks extending around it along the line of said apertures, which are exposed close along the inner edge of said ring-dial so that the stylus may be guided by said edge, a stop projecting inwardly over the said rotary dial to arrest the stylus at a given point, the rotatively-mounted hundreds-disk dial in horizontal line with said units and tens dial and whose peripheral edge substantially meets the same at a given reading-point, said hundreds-dial bearing the circular line of numerals and having the circular line of apertures to receive a stylus, a plate over said hundreds-dial and having an opening to expose some of said apertures therein and said plate being numbered along the line of said exposed apertures, and means for transmitting motion from the units and tens dial at each rotation of the same, to said hundreds-dial, combined with a thousands-dial in the form of a ring encompassing but slightly lower than said hundreds-dial and extending at one edge below said units and tens dial and said thousands-dial bearing the circular line of numerals and having the circular line of apertures to receive a stylus for actuating the same, a plate over said thousands-dial having an opening to expose some of the apertures therein and said plate bearing guiding-numerals along the edge of said opening, and means for actuating said thousands-dial at each rotation of said hun-

dreds-dial, all of said dials being horizontally disposed within a casing and said machine having reading-openings for said dials; substantially as set forth.

2. In an adding-machine, the rotatively-mounted units and tens dial bearing the line of numerals along its outer edge and having the series of apertures adjacent thereto to receive a stylus for rotating said dial, the fixed ring-dial over the outer portion of said rotary disk-dial and bearing numbered graduation-marks extending around it along the line of said apertures, which are exposed close along the inner edge of said ring-dial so that the stylus may be guided by said edge, a stop projecting inwardly over the said rotary dial to arrest the stylus at a given point, the rotatively-mounted hundreds-disk dial in horizontal line with said units and tens dial and whose peripheral edge substantially meets the same at a given reading-point, said hundreds-dial bearing the circular line of numerals and having the circular line of apertures to receive a stylus, a plate over said hundreds-dial and having an opening to expose some of said apertures therein and said plate being numbered along the line of said exposed apertures, and means for transmitting motion from the units and tens dial at each rotation of the same, to said hundreds-dial, combined with a thousands-dial in the form of a ring encompassing but slightly lower than said hundreds-dial and extending at one edge below said units and tens dial, and said thousands-dial bearing the circular line of numerals and having the circular line of apertures to receive a stylus for actuating the same, a plate over said thousands-dial having a segmental opening to expose some of the apertures therein and said plate bearing guiding-numerals along the edge of said opening, a star-wheel engaging recesses in the lower side of said thousands-dial and connected with a second star-wheel, and an arm carried by said hundreds-dial for engaging said second wheel at each rotation of said hundreds-dial and actuating said thousands-dial, all of said dials being horizontally disposed within a casing and said machine having reading-openings for said dials; substantially as set forth.

Signed at New York city, in the county of New York and State of New York, this 27th day of March, A. D. 1905.

EDWIN R. BEACH.

Witnesses:
CHAS. C. GILL,
ARTHUR MARION.