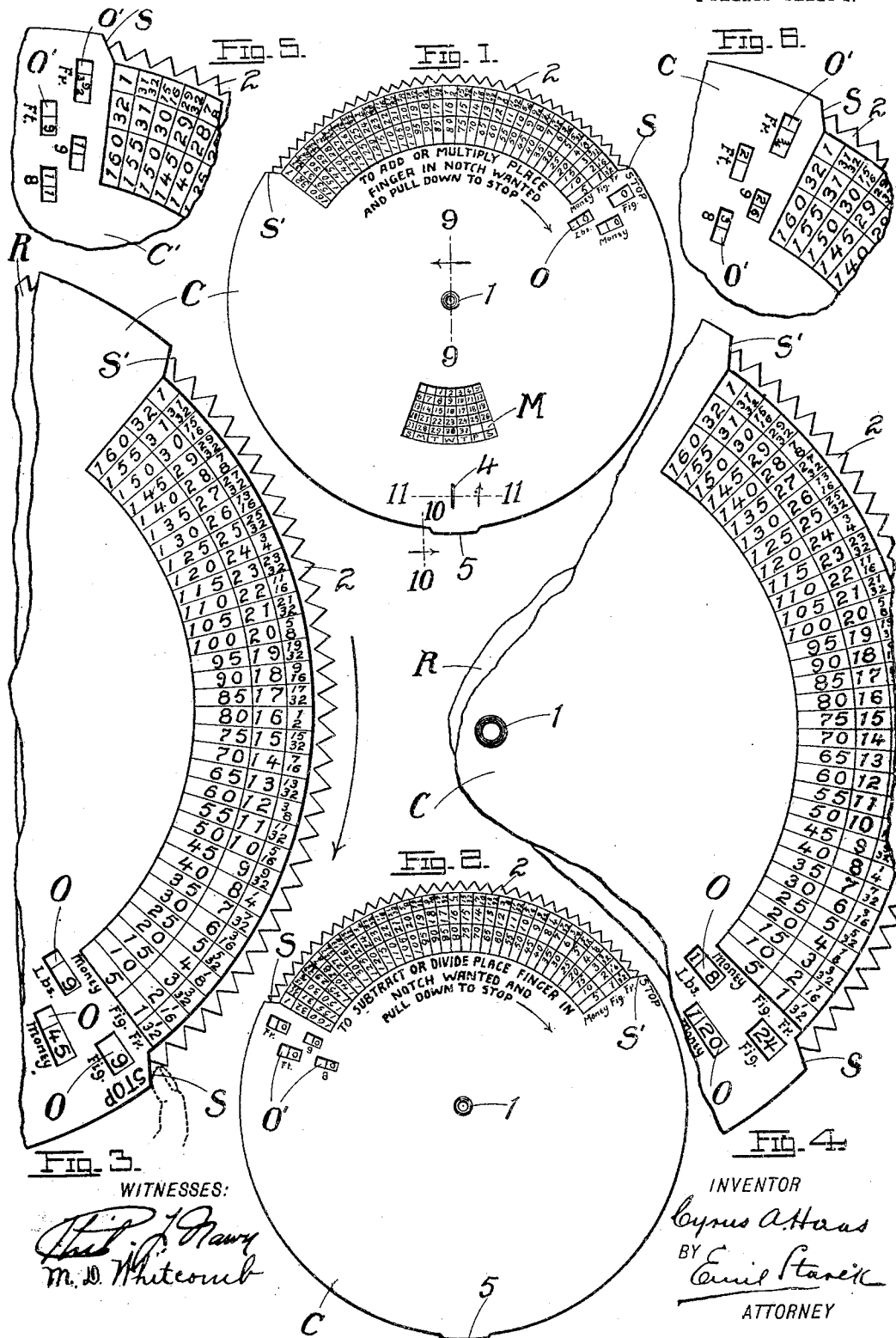


No. 808,045.

PATENTED DEC. 19, 1905.

C. A. HAAS.
POCKET CALCULATOR.
APPLICATION FILED SEPT. 23, 1903.

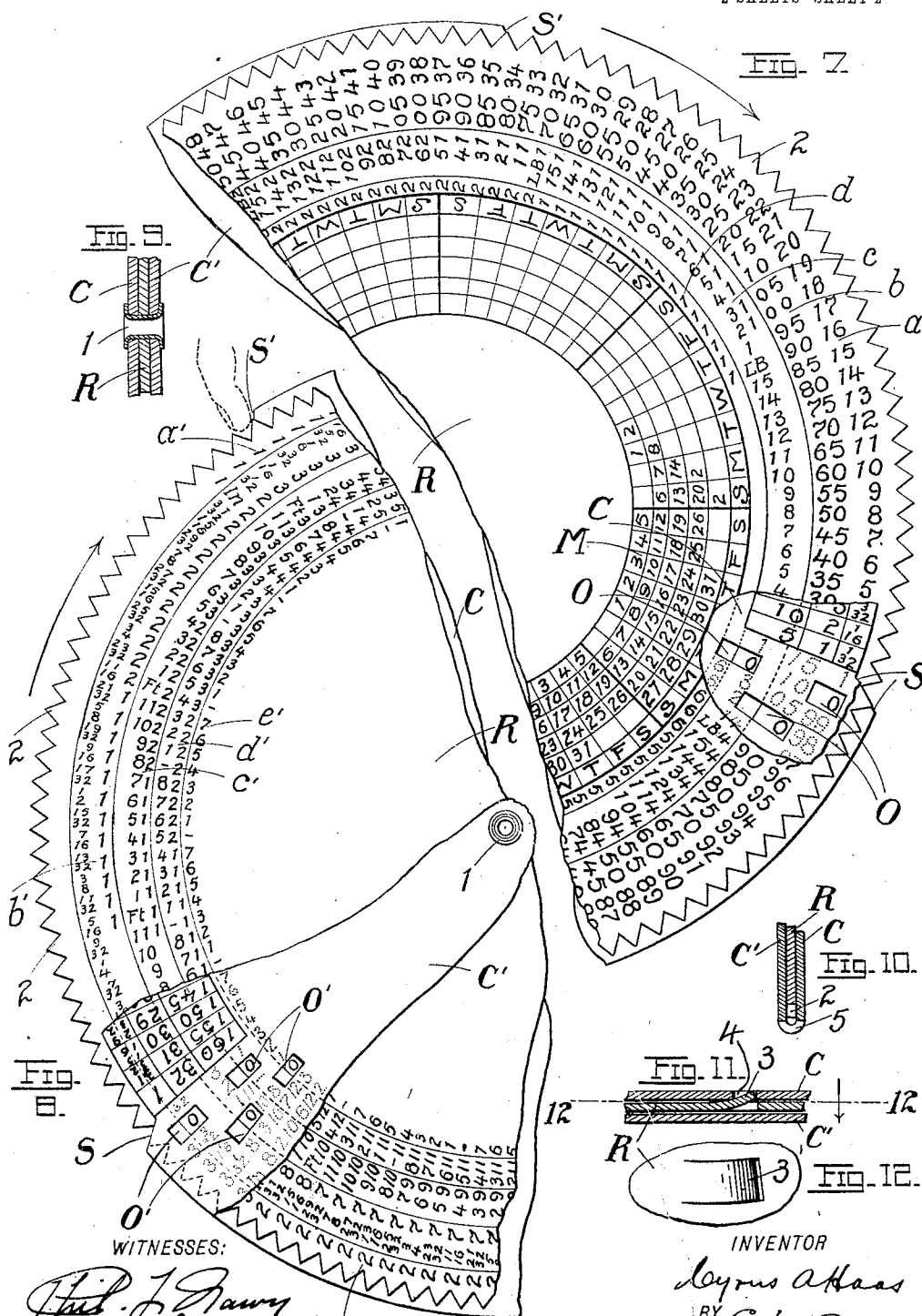
2 SHEETS—SHEET 1.



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2 SHEETS—SHEET 2



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POCKET-CALCULATOR.

No. 808,045.

Specification of Letters Patent.

Patented Dec. 19, 1905.

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To all whom it may concern:

Be it known that I, CYRUS A. HAAS, a citizen of the United States, residing at St. Louis, State of Missouri, have invented certain new and useful Improvements in Pocket-Calculators, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part hereof.

My invention has relation to improvements in pocket-calculators; and it consists in the novel construction of device more fully set forth in the specification and pointed out in the claim.

In the drawings, Figure 1 is a front face view of the device. Fig. 2 is a rear face view. Fig. 3 is an enlarged view of a portion of the front, the result-disk having been advanced nine notches or teeth. Fig. 4 is a similar view, the result-disk having been advanced twenty-four notches. Fig. 5 is an enlarged view of a portion of the rear face, giving the results corresponding to the position of the result-disk shown in Fig. 3. Fig. 6 is a similar view with position of the result-disk corresponding to that shown in Fig. 4. Fig. 7 is an enlarged front face view of a section of the rotatable result-disk. Fig. 8 is an enlarged rear face view of a section of the result-disk. Fig. 9 is a sectional detail through the pivot on line 9 9 of Fig. 1. Fig. 10 is a sectional detail on line 10 10 of Fig. 1, showing connecting-strip between the front and rear cover-plates. Fig. 11 is a sectional detail on line 11 11 of Fig. 1, showing construction of limiting-tongue carried by the rotatable disk; and Fig. 12 is a horizontal section on line 12 12 of Fig. 11.

The object of my invention is to construct a mechanical pocket-calculator by means of which mathematical results may be readily and conveniently obtained, particularly such as contemplate addition, subtraction, multiplication, and division in the abstract, such abstract results being referable to indices of various denominations in which the results can be expressed, the said device possessing further and other capabilities, as will be more fully apparent from a detailed description of the invention, which is as follows:

Referring to the drawings, C C' represent, respectively, the front and back cover-plates or "denomination-disks," and R an intermediate "result-disk," rotatable between them about a central spindle 1. A section of the periphery of each cover-plate is removed

to a suitable depth, so as to leave exposed a corresponding section of the toothed periphery of the intermediate disk, the teeth 2 serving as means for revolving the disk R during the calculating operation, while the device is held in one hand between the thumb and finger. The removal of the sections referred to results in the formation of peripheral shoulders or "stops" S S' on the cover-plates, against which the finger by which the toothed disk R is advanced may come in contact, as presently more fully apparent. The inclination of these shoulders corresponds to that of the side of the teeth 2, so that as the finger encounters the stop the operator is certain that a given tooth (or series of teeth) has been advanced the requisite distance to produce the proper results.

Disposed radially in circular columns between the stops S S' on the disk C are a series of figures whose denomination is indicated at one end of each column by the words "Money," "Fig." and "Fr.," meaning, respectively, money, figures, and fractions, the disposition of said figures being along radial lines terminating at the bases of the angles formed by the sides of the consecutive teeth on the result-disk R. Disposed also on the disk C in proximity to the stop S and in registry with the figure-columns on the disk R are three openings O, against which the denomination - symbols "Lbs.," "Money," and "Fig." are marked, whose purpose will presently be apparent. On the reverse face of the calculator—that is, on the disk C—are likewise disposed between the stops S S' a similar series of figured columns with similar denominations indicated thereon. Similarly disposed on the reverse face are four openings O', against which are marked "Fr.," "Pt.," "9," and "8," respectively, meaning fractions, feet, working day of nine hours, and working day of eight hours, said openings O' likewise registering with figure-columns on the adjacent face of the rotatable disk R, as presently will appear.

Marked radially and disposed circularly on the front face of the disk R (the face adjacent to the disk C) are a series of figure-columns *a b c d*, the column *a* being readable through the "Fig." opening O of the disk C, the column *b* and the units of column *c* being readable through the "Money" opening O, and the tens and hundreds of column *c* and column *d* being readable through the "Lbs." opening O of the disk C. (See Figs. 3, 4, 7.)

Marked radially and disposed circularly on the rear face of the disk R (the face adjacent to the disk C') are a series of figure-columns *a' b' c' d' e'*, the first two being readable through the "Fr." opening O' and the columns *c' d' e'* being readable, respectively, through the "Ft.," "9," and "8" openings O' of said disk C'.

The disk R is adapted to rotate in either direction, and while it may be rotated indefinitely if advanced in the direction indicated by arrow in Figs. 1 or 3, yet in the reverse direction it is limited to one complete revolution, (three hundred and sixty degrees,) it being prevented from further rotation by a resilient tongue 3, cut from the body of the disk and deflected outwardly sufficiently to engage the side wall of a slit 4, (toward which it may be advancing,) cut in the body of the disk C, Figs. 11, 12. When thus intercepted, the operator knows that the said result-disk is set at zero, the zeros of the figures of the various columns *a b c d* and *a' b' c' d' e'*, disposed on opposite faces of said disk, being readable through the several openings O O' of the covers or stationary denomination-disks C C'. (See Figs. 1, 2, 8, 9.) The covers C C' are preferably stamped or formed of a single piece of material, being bent against the inner disk R, a small section 5 of the material being left, about which the bend is effected, Figs. 1, 2, 10.

The operation of the device may be described as follows, and with a few examples cited the operator may evolve for himself various possibilities for the calculator: Let us assume that the disk R has been set to zero, as indicated in Figs. 1, 2, 7, 8. If the operator now seizes the ninth tooth from the stop S and advances the disk R in the direction indicated by the arrow in Fig. 3 until his finger, by which the rotation is effected, engages the stop S, then it follows that the several numbers in the columns *a b c d*, advanced opposite the openings O by this partial rotation of the disk R, will be readable through the openings, Fig. 3, all such numbers having been advanced nine teeth or notches or nine units from the zero position. Thus the figure "9" is readable through the "Fig." opening O, the figure "45" through the "Money" opening O, and "9" again through the "Lbs." opening O of the disk C. This result could not be otherwise, since the ninth tooth on the disk R from the zero position thereof corresponds to the figure "9" in columns *a* and *c* (see Fig. 7) and to figure "45" in the money-column on disk C, Fig. 3. If we start with the position of the parts as shown on Fig. 3 and advance the disk R fifteen teeth or notches farther, we shall have the results as indicated in Fig. 4—that is to say, we shall have added fifteen to nine in the figure-column, making "24" readable through the "Fig." opening; we shall have added seventy-five to forty-

five in the money-column, making "\$1.20" readable through the "Money" opening, and we shall have added fifteen to the "9" appearing on the right of the "Lbs." opening, making twenty-four ounces or one pound eight ounces, as fully seen in Fig. 4. It will be observed by referring to Figs. 4 and 7 that the column *d* represents the pounds denomination readable through the "Lbs." opening and that the tens or second row of figures of the column *c* are used to represent the ounces, the first row of said column *c* serving to represent the dollar denomination in the results readable through the "Money" opening, (as previously referred to in connection with the description of columns *a b c d*.) The foregoing represent the results on one face of the calculator for two successive advances of the disk R—viz., one advance of nine teeth followed by a second advance of fifteen teeth. Let us ascertain what has occurred on the opposite face of the calculator for the corresponding movements. As before stated, the disk R was set at zero before any movement took place. Upon advancing the said disk nine notches (see Fig. 5) we find that we have brought the ninth fraction (nine thirty-seconds) marked in column *b'* opposite the "Fr." opening O'. We have brought the ninth numeral of column *e'* opposite the opening marked "Ft.," designating nine inches. We have brought the proper figure from the same column *e'* opposite the opening marked "9," designating one day of nine hours. We have brought the proper figures from columns *d' e'* opposite the opening marked "8," designating one day one hour. (See Fig. 5.) Upon advancing the result-disk R fifteen additional notches, Fig. 6, we have added fifteen thirty-seconds to the previous nine thirty-seconds, making twenty-four thirty-seconds, or three-fourths. We have added fifteen to the nine inches of the "Ft." opening, making twenty-four inches, or two feet. We have added fifteen hours to one day of nine hours, making twenty-four hours, or two days six hours, and we have likewise for an eight-hour day the equivalent of three days. These aggregates are clear from an inspection of Fig. 6. Where the fractional additions amount to more than a unit, then column *a'* is brought into requisition, giving us a total of so many units and a fraction, as is obvious without special illustration. Since multiplication is merely a species of addition, where the same number is repeated a given number of times it is apparent that any problem of multiplication could be worked out on the principle already outlined for additions. Thus if we wish to multiply three by nine we simply advance the disk R three times nine teeth at a time. If we wish to subtract fifteen from twenty-four, we first set the disk R to twenty-four, then turn it back fifteen notches, as per arrow in Fig. 6, when the result will be "9," as

is obvious. If we wish to divide, say, twenty-four by nine, we set the disk to "24," then turn it back nine notches at a time, beginning with the ninth tooth from the stop S'.

5 Then we should find we shall have advanced the disk twice nine notches and six more, (by which time the disk will have been intercepted by the tongue 3 at the zero position,) meaning that nine goes into twenty-four
10 twice with six for a remainder. Had we divided twenty-four by eight then we should have advanced the disk eight teeth at a time, this resulting in three advances with no remainder.

15 The object of placing the numbers on both faces of the calculator is merely a matter of convenience and economy of space, and were the disks large enough the numbers could all be placed on one side. To avoid congestion
20 of figures for a pocket-calculator, however, it is expedient to distribute them on both faces.

The front face of the disk R may be provided with a perpetual calendar M, the current month of which may be exposed through
25 an open segment cut in the front cover C, Figs. 1, 7.

30 The above examples are merely indicative of the possibilities of the device, and no attempt is here made of citing examples cover-

ing various mathematical problems, as these will occur to any one who has skilled himself in the use of the calculator.

What are here referred to as the "indices" of the various denominations are the words 35 "Money," "Lbs.," "Ft.," "Fr.," and the like marked on the denomination disks or covers, the disk R being here termed the "result-disk," since upon it the totals of any calculation are read through the denomination-
40 disks.

It is of course apparent that I need not limit the invention to pocket-calculators.

Having described my invention, what I claim is—

45 In a pocket-calculator, two cover plates or disks, an intermediate rotatable result-disk, a tongue cut from the intermediate disk and deflected outwardly therefrom, and a slit formed in one of the cover-disks against one
50 wall of which the free end of the tongue can impinge and intercept the rotation of the result-disk in one direction, substantially as set forth.

In testimony whereof I affix my signature 55 in presence of two witnesses.

CYRUS A. HAAS.

Witnesses:

EMIL STAREK,
MARY D. WHITCOMB.