No. 814,488. PATENTED MAR. 6, 1906.

W. H. WATSON.

COMPUTING DEVICE.

APPLICATION FILED AUG. 18, 1905.

2 SHEETS—SHEET 1.

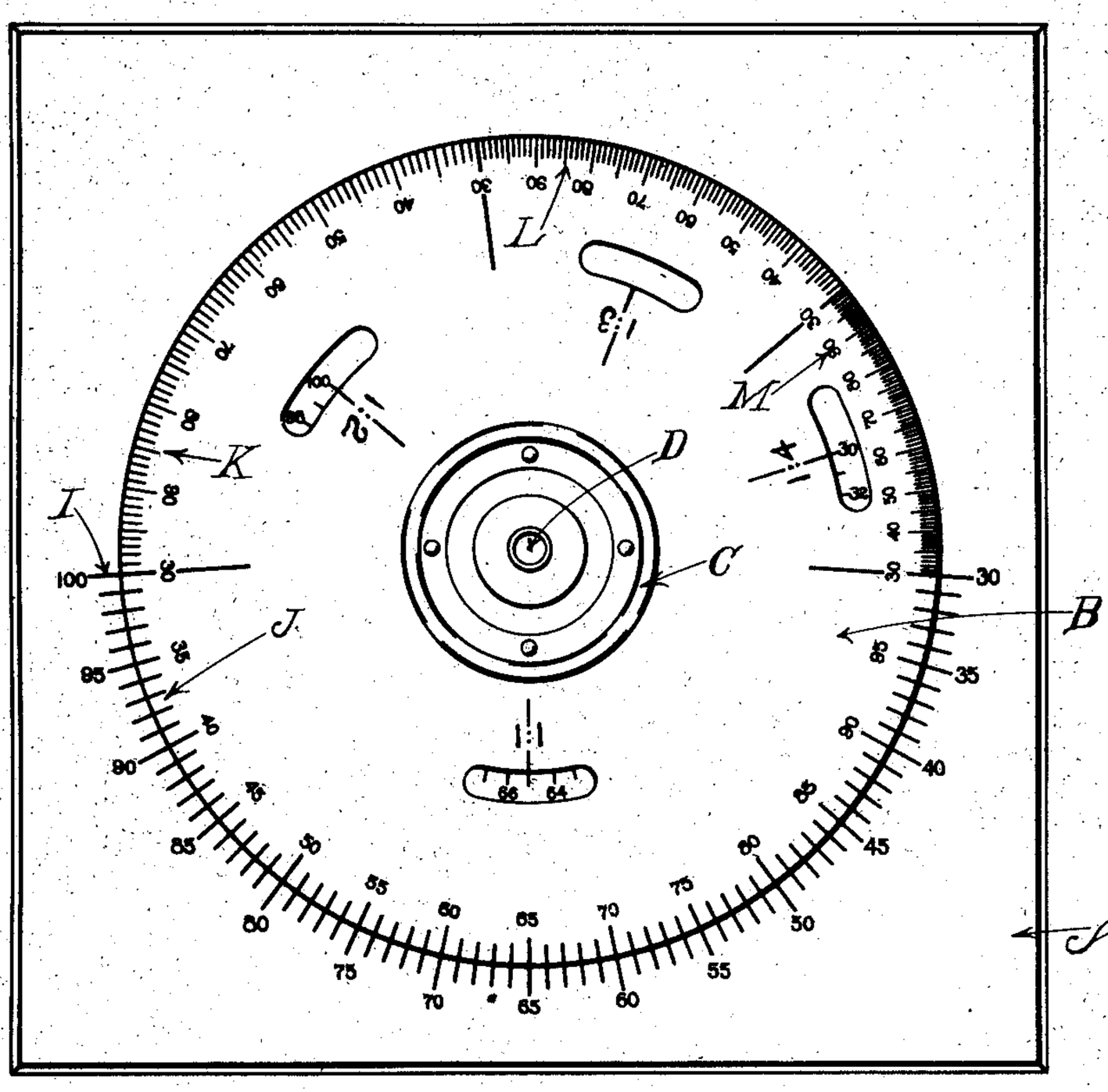

Fig. 1.

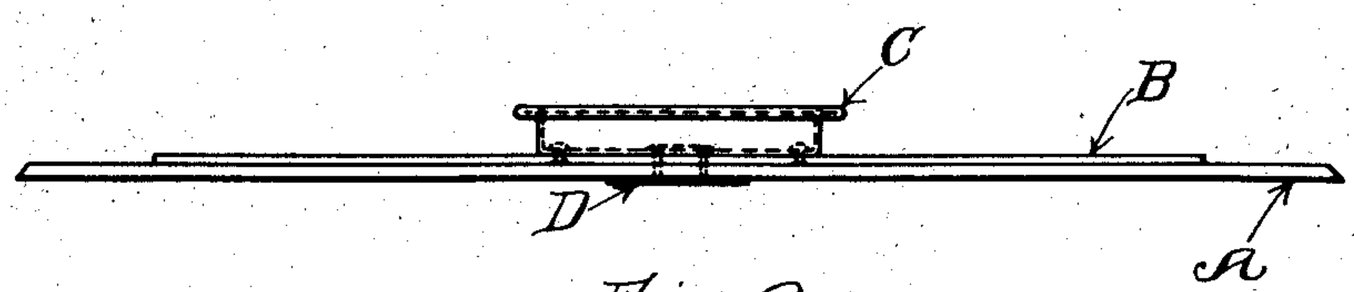

Fig. 2.

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2 SHEETS—SHEET 2.

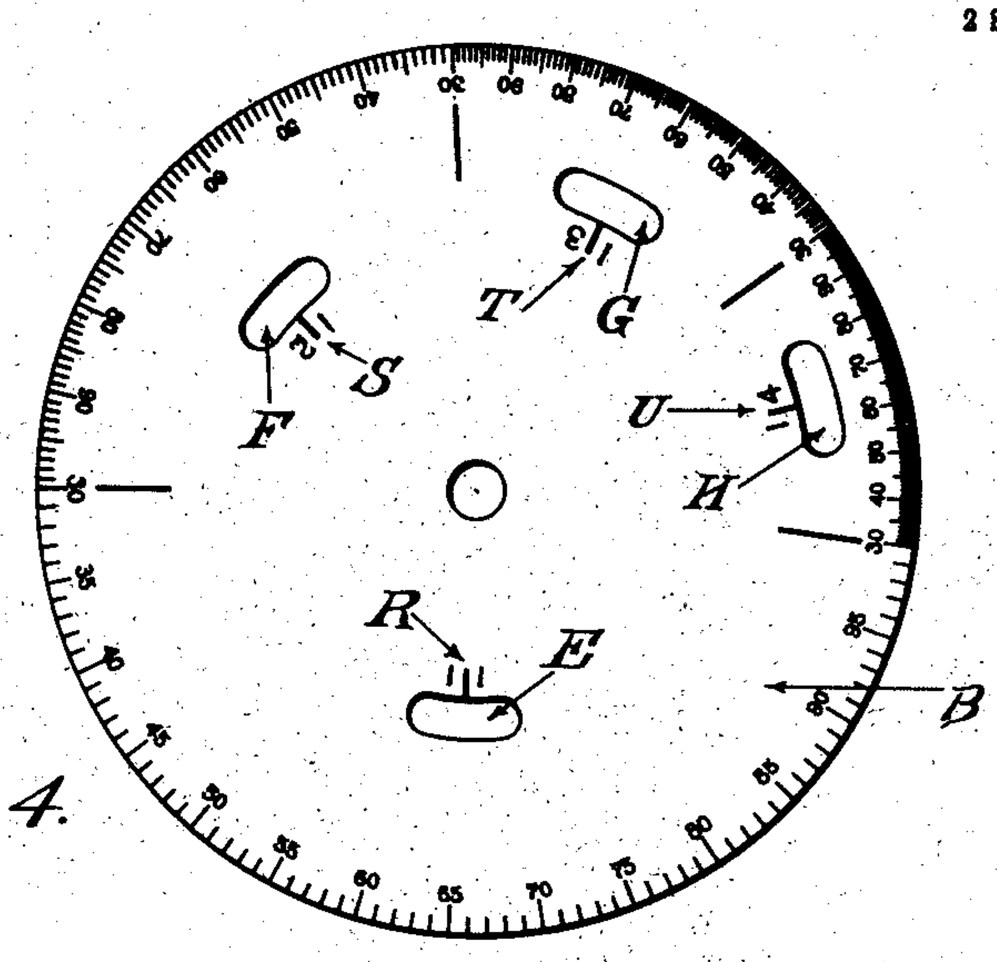

Fig. 4.

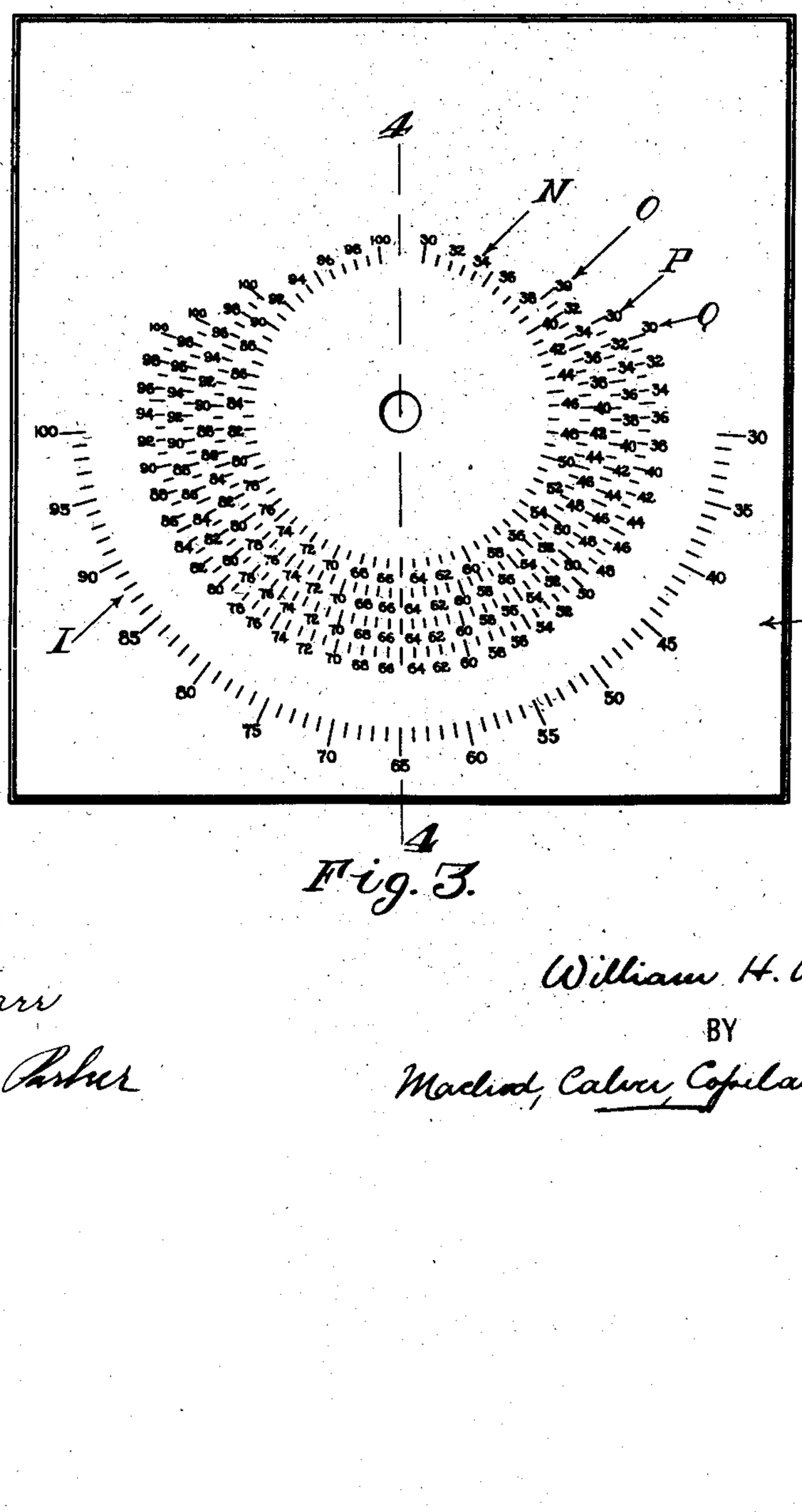

Fig. 3.

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UNITED STATES PATENT OFFICE.

WILLIAM H. WATSON, OF DANVERS, MASSACHUSETTS.

COMPUTING DEVICE.

No. 814,488. Specification of Letters Patent. Patented March 6, 1906.

Application filed August 18, 1905. Serial No. 274,691.

To all whom it may concern:

Be it known that I, WILLIAM H. WATSON, a citizen of the United States, residing at Danvers, county of Essex, State of Massachusetts, have invented a certain new and useful Improvement in Computing Devices, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention has for its object to provide a convenient device by means of which averages and proportions may be computed rapidly and without figuring.

The device is especially adapted for use where it is desired to strike an average between two numbers or where it is desired to find the average between two numbers one of which is to be given a greater weight than the other—as, for instance, where a teacher has to compute a scholar's marks and desires to give the mark on the daily recitations three times the weight which it is desired to give to the mark obtained by the pupil upon the examination. If, for instance, the pupil has obtained a mark for the recitations of "84" and a mark for the examination of "96" and it is desired to give recitations three times the weight of the examination it is found that the desired average is "87."

My invention will be fully understood from the following description, taken in connection with the accompanying drawings, and the novel features thereof are pointed out and clearly defined in the claims at the close of this specification.

Referring now to the drawings, Figure 1 is a plan view of a device embodying my invention. Fig. 2 is a side elevation thereof. Fig. 3 is a plan view of the fixed card. Fig. 4 is a plan view of the movable card.

Referring now to the drawings, at A is indicated a card, which for convenience I have called the "fixed card," and which may be made of any convenient substance—as, for instance, cardboard or celluloid. Upon this card is pivoted at its center a movable card B, which is circular in shape and is somewhat smaller than the fixed card A. It is necessary that the cards A and B be movable each with relation to the other; but I have designated them by the terms "fixed" and "movable" to distinguish them. The movable card B is provided with a handle C, by means of which it may be rotated about the central pivot D. Slots E, F, G, and H are cut in the said movable card B to permit the user to see certain figures on the fixed card, as will be later described.

In the drawings I have shown my device as adapted especially for use in averaging percentages, and as the percentages below thirty are ordinarily negligible in the work for which my computing device is intended and as the comparative weights to be given to the numbers to be averaged are usually one to one, one to two, one to three, and one to four I have shown in the drawings a computing device adapted for this particular work; but it is to be understood, of course, that the invention may be embodied in other forms arranged for use where other proportions or sets of numbers are required.

Upon the fixed card A and at a distance from its center about equal to the radius of the movable card B, I divide a convenient arc of a circle into equal spaces, numbered from "30" to 100," as indicated at I. For convenience I have denominated this arc the "greater-weight scale."

The circumference of the movable card B is similarly divided into arcs, which I denominate the "lesser-weight scales." Each of these scales, which are indicated by the reference characters J, K, L, and M, are divided into equal spaces numbered from thirty to one hundred, in the same manner as has been described in connection with the greater-weight scale I on the fixed card A. The lesser-weight scales have a length proportionate to the length of the greater-weight scale and to the relative weights to be given to the numbers to be averaged. Thus the scale K is one-half the length of the scale J, the numbers to be averaged by the use of this scale being given the comparative weight of one to two. The length of the lesser-weight scale L is one-third the length of the greater-weight scale I, and the length of the lesser-weight scale M is one-fourth of the length of the greater-weight scale I, these scales being used for proportions of one to three and one to four. By choosing a right length for the arc occupied by the scale I and using the proportions mentioned the lengths of the four lesser-weight scales occupy the entire circumference of the movable card B. It will thus be seen that the arc occupied by the scales J, K, L, and M contains, respectively, one hundred and seventy-two and four-fifths, eighty-six and two-fifths, fifty-seven and

three-fifths, and forty-three and one-fifth degrees.

Concentric with the greater-weight scale I and nearer to the center of the fixed card A are arranged what I denominate "result-scales," one for each of the different proportions on the basis of which the averages are to be computed. These result-scales are indicated by the reference characters N, O, P, and Q, respectively, and correspond to the lesser-weight scales J, K, L, and M, respectively. Each of these result-scales has a length in degrees equal to the length of the greater-weight scale plus the length of the lesser-weight scale to which the result-scale corresponds. Thus the result-scale N has a length equal to the length of the greater-weight scale I plus the length of the lesser-weight scale K, to which the result-scale N corresponds, and the result-scale Q has a length equal to the greater-weight scale I plus the length of the lesser-weight scale M, to which the result-scale Q corresponds.

The result-scales N, O, P, and Q are located at radial distances from the center of the fixed card A equal to the radial distances of the holes or slots E, F, G, and H, so that when the movable card B is revolved about its pivot certain of the figures and division-lines of the sets of scales N, O, P, and Q appear and are visible through their respective slots E, F, G, and H. I provide each of the said slots or holes E, F, G, and H with indicating marks or pointers R, S, T, and U, respectively, each of the said pointers being located in the middle of the lesser-weight scale to which it applies.

I find it convenient to locate the result-scales symmetrically of the median line 4 4 of the greater-weight scale and to place the pointers on the movable card on the median lines of the arcs of the lesser-weight scales to which they apply; but this is not necessary so long as the pointer on the movable card bears the same relation to the position of the lesser-weight scale as the result-scale does to the position of the greater-weight scale.

It is to be noted that the divisions on the fixed card A from thirty to one hundred are numbered clockwise, while the divisions on the movable card B are numbered counter-clockwise. It is further to be noted that in this specification I have referred to the "length of the various scales." By this is to be understood the length measured in degrees without regard to the radius of the arc which forms the scale referred to.

Having now described the manner in which I lay out my improved computing device, I will explain the mode of operation by means of which I am able to obtain the averages and proportions.

Let it be supposed that it is desired to obtain the simple average of the two numbers "84" and "96." The division-line indicating the number "84" on the lesser-weight scale J of the movable card B is placed to coincide with the division-line corresponding to the number "96" on the greater-weight scale I on the fixed card. The pointer R will then be seen to point to the division-line corresponding to the number "90" of the result-scale N, this figure being seen through the slot or aperture E corresponding to the lesser-weight scale which is used—viz., that marked "1 to 1." If it is desired that the number "96" be given twice the weight of the number "84," the scale K is used instead of the scale J, the division-line marked "84" on that scale being placed in registration with the division-line corresponding to "96" on the greater-weight scale I. The reading is then made by means of the pointer S, which is provided for the lesser-weight scale K. The desired result, "92," may be seen through the slot F. In the same manner other averages may be obtained.

A general rule for the operation of my improved averaging device may be stated as follows: Find the number to be given the least weight on the lesser-weight scale marked with the proportion desired, turn the movable card until the number found coincides with the division-line of the greater-weight scale on the fixed card corresponding to the other number. Then read the number indicated by the pointer for the lesser-weight scale where the first number was found. When a simple average is to be found, either number may be found on the fixed card or on the movable card.

What I claim is—

1. In a computing device of the character described the combination with a fixed and a movable card, of a greater-weight scale and a result-scale on the fixed card, the said result-scale having a length equal to that of the greater-weight scale plus the length of a lesser-weight scale, a lesser-weight scale on the said movable card having a length proportionate to the length of the greater-weight scale and the relative weight to be given to the two numbers to be averaged, and a pointer for the said lesser-weight scale to indicate divisions of said result-scale.

2. In a computing device of the character described the combination with a fixed and movable card of a greater-weight scale and a series of result-scales on the fixed card, the said result-scales having a length equal to that of the said greater-weight scale plus the length of a corresponding lesser-weight scale, lesser-weight scales on the said movable card having lengths proportionate to the length of the said greater-weight scale and the relative weights to be given the two numbers to be averaged, and a pointer for each of the said lesser-weight scales.

3. In a computing device of the character described, the combination with a fixed and

movable card, of a greater-weight scale and a series of result-scales on the fixed card, the said result-scales having a length equal to that of the said greater-weight scale plus the length of a corresponding lesser-weight scale, lesser-weight scales arranged about the circumference of the said movable card having lengths proportionate to the length of the said greater-weight scale and the relative weights to be given to the numbers to be averaged and a pointer on the median line of each of the said lesser-weight scales.

4. In a computing device of the character described, the combination with a fixed and a movable card, of a greater-weight scale and result-scales arranged on the fixed card concentrically with relation to each other, the said result-scales having a length equal to that of the greater-weight scale plus the length of a corresponding lesser-weight scale, a lesser-weight scale on the said movable card having a length proportionate to the length of the greater-weight scale and the relative weight to be given to the two numbers to be averaged, and a pointer to indicate divisions of said result-scales.

5. In a computing device of the character described, the combination with a fixed and a movable card, of greater-weight scale and a result-scale arranged concentrically with relation to each other, the said result-scale having a length equal to that of the greater-weight scale plus the length of a lesser-weight scale, a lesser-weight scale on the said movable card having a length proportionate to the length of the greater-weight scale and the relative weight to be given to the two numbers to be averaged, slots in the said movable card for each lesser-weight scale through which the divisions of the result-scale are visible, and a pointer to indicate divisions of said result-scales.

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

WILLIAM H. WATSON.

Witnesses:

BESSIE G. MORRIS,

GEORGE P. DIKE.