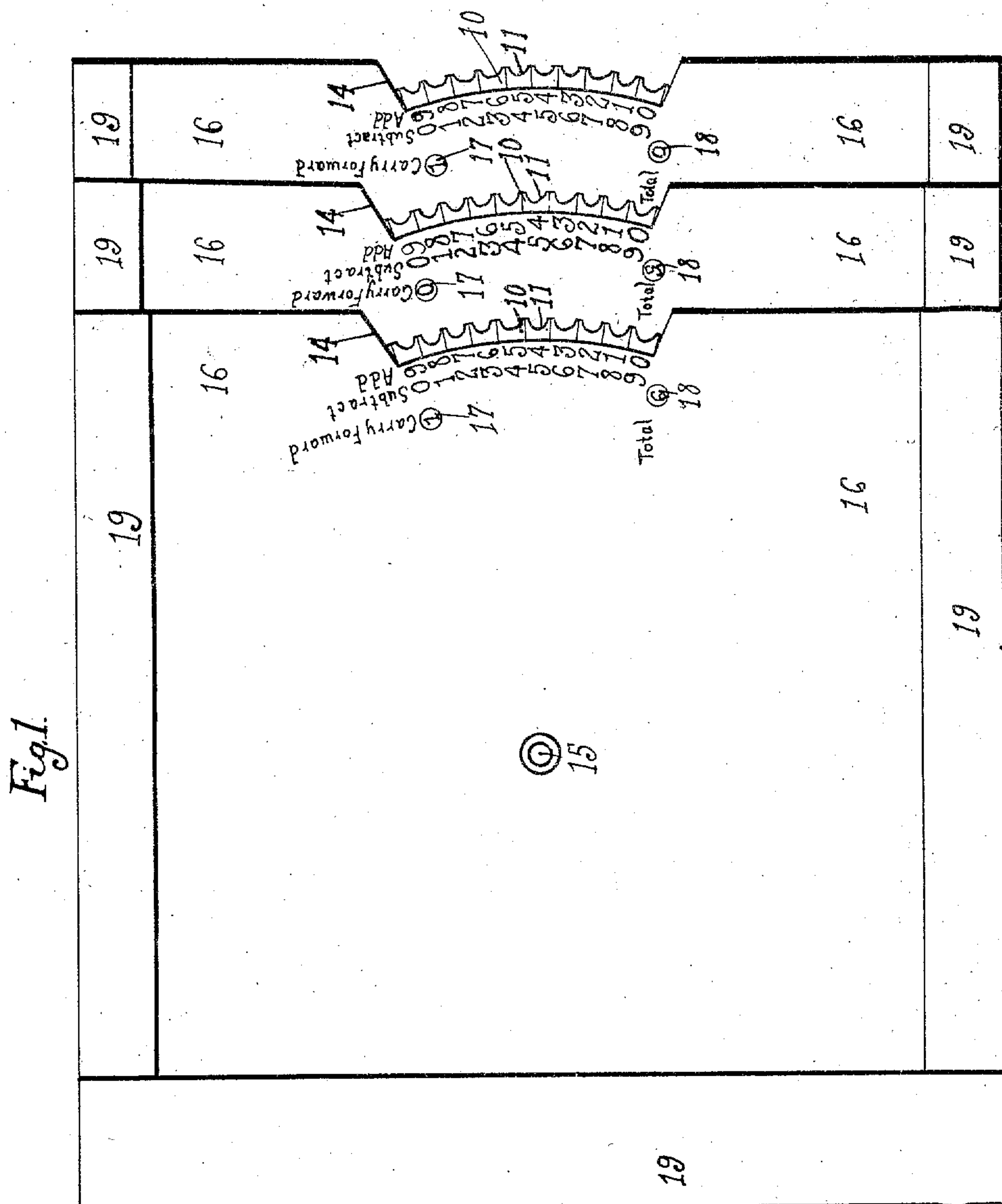


APPLICATION FILED JUNE 1, 1909.

Patented Aug. 9, 1910.

2 SHEETS—SHEET 1.



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2 SHEETS—SHEET 2.

Fig. 2.

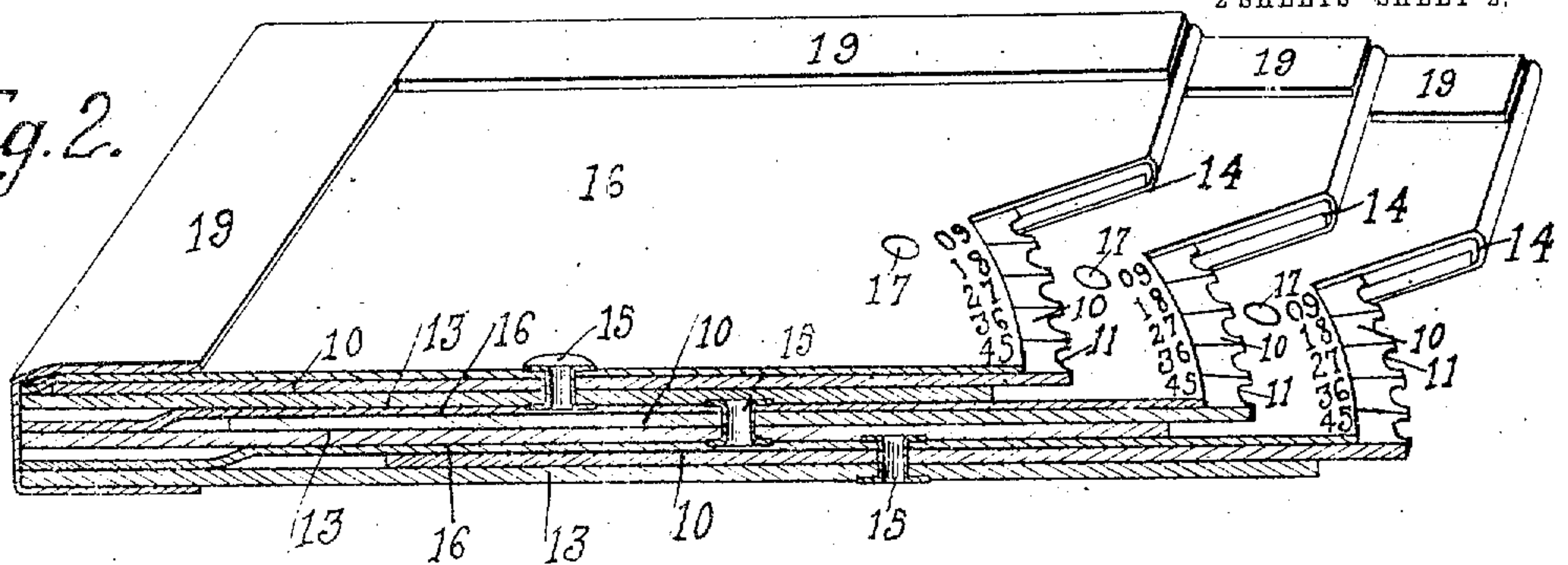
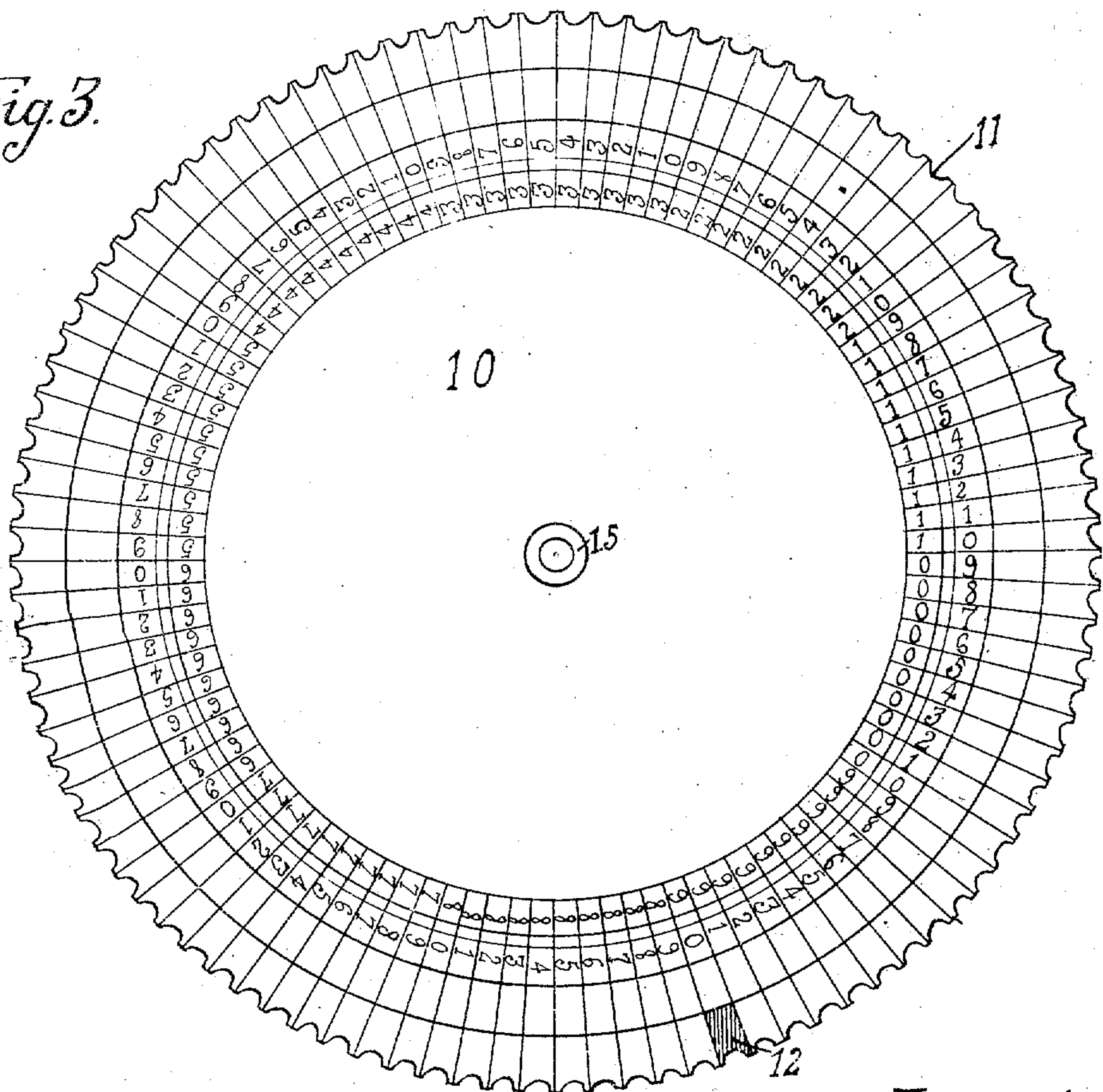


Fig. 3.



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UNITED STATES PATENT OFFICE.

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CALCULATING DEVICE.

966,752.

Specification of Letters Patent.

Patented Aug. 9, 1910.

Application filed June 1, 1908. Serial No. 499,523.

To all whom it may concern:

Be it known that I, MAYNARD T. JOY, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented a certain new and useful Calculating Device, of which the following is a specification.

The object of my invention is to provide a device of simple, durable and inexpensive construction, that may be made almost entirely from pasteboard and paper and that may be used for carrying out all of the ordinary purposes for which a calculating machine is usually employed and without the use of mechanical total-carrying devices.

My invention consists in the construction, arrangement, and combination of the various parts of the device, whereby the objects contemplated are attained as hereinafter more fully set forth, pointed out in my claims, and illustrated in the accompanying drawings, in which—

Figure 1 shows a plan view of a complete device embodying my invention. Fig. 2 shows a sectional, perspective view of same taken on a longitudinal, central line, and Fig. 3 shows a plan view of one of the adding wheels detached.

In the accompanying drawings, I have shown a frame and three adding wheels. Obviously, the number of the adding wheels is not material and either more or less may be used as desired.

Each adding wheel consists of a disk preferably made of cardboard, having on one face near its periphery, a series of radially extending lines dividing it into approximately one hundred spaces, there being a notch in the periphery of the disk between each pair of said division lines.

Arranged in a circle on the face of the disk is a series of numerals, one numeral being arranged between each of the radial division lines. This row is composed of a number of series of numerals, each series beginning with 0 and running consecutively to 9, one numeral between each pair of radial division lines. These series of numerals extend all around the disk and, hence, there are ten series of numerals ranging from 0 to 9. Said numerals are arranged upon the disk contrary clockwise, as clearly shown in Fig. 3.

Adjacent to the row of numerals just described, is a second row of numerals arranged in a circle nearer the center of the disk than the first row of numerals. This second row of numerals comprises a number of series. In the first series there are ten of the numeral 1, said numerals 1 being arranged in line radially with the numerals of one of the first mentioned series with numerals from 0 to 9. The next set of numerals are ten 2's, then ten 3's, and so on to 0, these sets being arranged contrary clockwise beginning with 1 and ending with 0. Hence, in each of the spaces between two radial division lines, there is a numeral nearest the center of the disk in the row that is hereinafter called the "Carrying row" and there is also a numeral in the outer row which is hereinafter called the "Calculating series". In other words, there are, on the inner or carrying row, ten series of numerals, all of the numerals in each series being the same; and on the outer or calculating row, there are ten series of numerals, each series comprising the numerals 0 to 9 consecutively arranged. In order to provide for quickly and conveniently returning the calculating wheel to starting point, I have provided, in one of the radial spaces, a red or other colored mark indicated by the numeral 12. This mark is in the same radial space in which is contained the numeral 9 on the carrying row and the numeral 0 on the calculating row, as clearly shown in Fig. 3.

The means for supporting the calculating disks comprises a base preferably made of cardboard and having a portion of one end cut away on a segmental line leaving the two radial shoulders. These radial shoulders are spaced apart from each other a distance corresponding to ten of the radial spaces on the calculating disk and the edge of the disk projects beyond the cut-away portion of the base a slight distance, as shown in Fig. 1. Said parts are so arranged that an operator may readily and easily insert a finger nail in any one of the notches and then move his finger toward one of the shoulders, and the calculating disk will be stopped when his finger strikes upon either one of the shoulders.

Mounted on top of the base is the calculating disk rotatably supported thereon by means of a rivet. Overlapping the

disk 10 is a sheet of paper 16 which is cut away at one end substantially in the same manner as the base 13, and which is provided with two rows of numerals spaced apart the same distance as the radial spaces on that portion of the calculating disk that is adjacent to the circular edge of the sheet of paper 16. The row of numerals nearest to said edge begins with 0 at the bottom and is continued consecutively to 9 at the top, and adjacent to this row of figures is the word "Add". Adjacent to said first row of figures on the sheet 16 is a second row beginning with 0 at the top and continuing consecutively to 9 at the bottom, and adjacent to this second row is the word "Subtract". In said sheet of paper 16, is an opening 17 through which one of the numerals of the inner row of the calculating disk may be seen, and formed in said sheet of paper 16, near the bottom of the segmental portion thereof, is an opening 18 through which one of the numerals of the outer row of figures on the calculating disk may be seen. These openings 17 and 18 must be so arranged and disposed relative to each other and to the numerals upon the disk 10 that, when the radial space containing the mark 12 is in such position that the numeral 0 shows through the opening 18, then the first one of the numerals 0 on the inner row of numerals on the calculating disk will appear through the opening 17.

When three calculating disks are used in one device, each disk is provided with a base 13 and a cover sheet 16, and they are arranged as shown in Figs. 1 and 2, one above the other, the upper ones being offset from the edge of the adjacent one under them so that the openings 17 and 18 in each of the sheets 16 may be clearly seen and so that the operator may have access to the edges of the disks 10. The three disks and the bases and cover sheets for them are all preferably connected by means of a binding strip 19 secured to the edges thereof.

In practice, it is obvious that the device may be constructed very cheaply and inexpensively because the calculating disks may be stamped out by means of dies and the numerals and marks placed thereon by an ordinary printing process, and the cover sheets 16 may also be stamped out by means of dies and printed in an ordinary manner.

In practical use, the device is susceptible of carrying out all of the operations of which calculating machines are ordinarily capable. As a practical illustration of the operation of the device, we will assume, for instance, that the number 976 and the number 714 are to be added. It is to be understood that in the arrangement of the device shown in Fig. 1, the calculating disk to the right is for units, the next one to the left for tens, and the last one to the left for

hundreds. The operator places one finger nail in the notch 11 adjacent to the numeral 9 in the "Add" column of the hundreds calculating disk, and he then moves his finger downwardly until it strikes upon the lower shoulder 14, thereby causing the calculating disk to be moved nine spaces, and when this is done, the numeral 9 on the outer row of the calculating disk will appear through the adjacent opening 18. He then places his finger nail in the notch adjacent to the numeral 7 in the "Add" column of the tens calculating disk and moves his finger downwardly until it strikes the shoulder 14, whereupon the numeral 7 will show through the adjacent opening 18. He then places his finger nail in the notch adjacent to the numeral 6 on the "Add" column of the units calculating disk and moves his finger down until it strikes the shoulder 14, whereupon the numeral 6 will show through the adjacent opening 18. Thus far none of the calculating disks have moved ten spaces, hence the numerals 0 will show through all of the openings 17. Then in order to add the number 714 to the number already placed on the device, the operator places his finger nail in the notch adjacent to the numeral 7 in the "Add" column of the hundreds calculating disk and moves it down until it strikes the shoulder, whereupon the numeral 1 on the inner row of numerals on the calculating disk will appear through the opening 17 belonging to the hundreds disk and the numeral 6 will appear through the opening 18 in the hundreds disk. He then places his finger nail in the notch adjacent to the numeral 1 in the "Add" column belonging to the tens disk and moves it downwardly, thus causing the numeral 8 to appear through the opening 18 thereof, and he finally places his finger nail in the notch adjacent to the numeral 4 in the "Add" column belonging to the units disk and moves his finger downwardly, thus causing the numeral 0 to appear in the adjacent opening 18, and the numeral 1 to appear in the adjacent opening 17. Therefore as a result of the operations before described, the numerals 1, 0, 1 appear consecutively through the openings 17, and the numerals 6, 8, 0 appear consecutively through the openings 18.

In order to correct the addition, it is necessary to carry the totals from one disk to the other and on the units disk the numeral 1 appears in the "Carry forward" opening 17, therefore the operator carries this forward by moving the tens calculating disk one number space downwardly, thus causing the numeral 9 to appear through the opening 18 belonging to the tens disk. To read the total amount of the addition, therefore, the operator takes the numeral 1 which appears through the "Carry for-

ward" opening belonging to the hundreds disk and then the numerals appearing through the total openings 18 of all three disks. This arrangement is shown in Fig. 1 of the drawings, and indicates that the total amount of the numbers added together is 1690.

It is obvious that the same principle of operation is obtained where only two series of numerals beginning with 0 and ending with 9 are used on each calculating wheel and only one series of numerals for carrying purposes are used. Any number of such series up to ten, as shown by the illustration in Fig. 3, may be used. I have found that the most convenient number to be used is ten as illustrated in Fig. 3.

In manipulating the device, the operator may complete the addition of a series of numbers, each containing as many digits as the number of calculating disks, which series of additions may be ten or more before it is necessary to manipulate the carrying feature of the device. Then when he finds that any of the numerals appearing through the "Carry forward" openings is 9 or less, he may then carry this forward to the next calculating disk to the left in the same manner as before described, hence the operation of adding may be carried on rapidly to an indefinite extent and the operator need pay attention to the carrying of totals only at such times as the larger numerals appear through the "Carry forward" openings, and the total amount of the addition may be readily seen at any time without further manipulation of the device, by reading the numerals found in the "Carry forward" opening on the last disk to the left and the numbers found in the total openings for the other disks.

Assuming that it is desired to use the device for subtracting purposes, and assuming further that the calculating disks are in the positions shown in Fig. 1 and that it is desired to subtract the number 270 from the total there appearing, then the operator places his finger nail in the notch adjacent to the numeral 2 on the "Subtract" column belonging to the hundreds disk and moves the disk upwardly until his finger strikes on the upper shoulder 14. Then, in the tens disk, he places his finger nail in the notch adjacent to the numeral 7 of the "Subtract" column and moves his finger upwardly. No manipulation of the units disk is necessary in the example given. When this is done, it will be seen that the numerals 4 and 3 will appear, respectively, through the total openings belonging to the hundreds and tens disks so that the total amount will be 1430. In this connection, it may be explained that in subtracting by the use of this device, the totals must be carried mentally by the operator. It has

been found, however, that an operator becomes efficient in this after a slight amount of practice.

I claim as my invention.

1. In a calculating device, the combination of a cover sheet having a segmental portion at one edge, a disk pivotally connected to the cover sheet and having two circular rows with numerals thereon, one row comprising a number of series of numerals, 10 to each series, all of the same value, one of said series consisting of ten 1's, the next of ten 2's, etc., and a second row of numerals on said disk containing a number of series of numerals, the numerals of each series beginning with 0 and continuing consecutively to 9, the said cover sheet being formed with openings through which one numeral of each of said rows of numerals may be seen, said disk being provided with means whereby it may be readily rotated, a series of numerals on the cover sheet adjacent to the segmental edge thereof beginning at the bottom with 0 and extending consecutively to 9 at the top, and a second row of numerals adjacent to the last mentioned row and arranged on the cover sheet beginning at the bottom with 9 adjacent to the 0 of the first mentioned row and continuing consecutively in inverse order to 0 at the top adjacent to the 9 at the top of the first mentioned row, for the purposes stated.

2. In a calculating machine, the combination of a series of cover sheets arranged one above the other with the right edge portion of each cover sheet projected beyond the corresponding edge portion of the sheet above it, each of said sheets having at the central portion of its right edge a segmental portion with shoulders formed between the ends of said segmental portions of the adjacent side edges of said sheets, each of said cover sheets being also provided with a small opening adjacent to the top of said segmental portion, said openings being so arranged that they will be in line with each other and visible to the operator, each of said cover sheets being also provided with a second opening adjacent to the bottom of the segmental portion also so arranged that they will be in line with each other and be visible to the operator, each of said cover sheets being also provided adjacent to the segmental portion with a row of numerals beginning with 0 at the bottom and continuing consecutively to 9 at the top and a second row of numerals adjacent to the 0 beginning with 9 at the bottom and continuing consecutively in inverse order to 0 at the top, a disk mounted beneath each cover sheet, and each being provided with a notched periphery to project beyond the segmental portion of the cover sheet to which the disk is pivoted so that said

notches may be engaged by an operator's finger for turning the disk, each of said disks being provided with two rows of numerals, one row being provided with a number of series of numerals, all of the numerals in each series being of the same value and said numbers being consecutively arranged on the disk contrary-clockwise, and also being so arranged that one of said numerals only may be viewed by the operator through the opening in the corresponding cover sheet near the top of the segmental portion, and the other row comprising a number of series of numerals, each

series beginning with 0 and continuing consecutively to 9 arranged contrary-clockwise, the numerals in the latter row being so arranged that one numeral only may be viewed through the opening in the cover sheet near the bottom of the said segmental portion, substantially as and for the purposes stated. 15 20

Des Moines, Iowa, April 29, 1909.

MAYNARD T. JOY.

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