

Dec. 3, 1940.

E. GRUNBLEHNER

2,223,612

ADDING MACHINE

Filed March 3, 1939

5 Sheets-Sheet 1

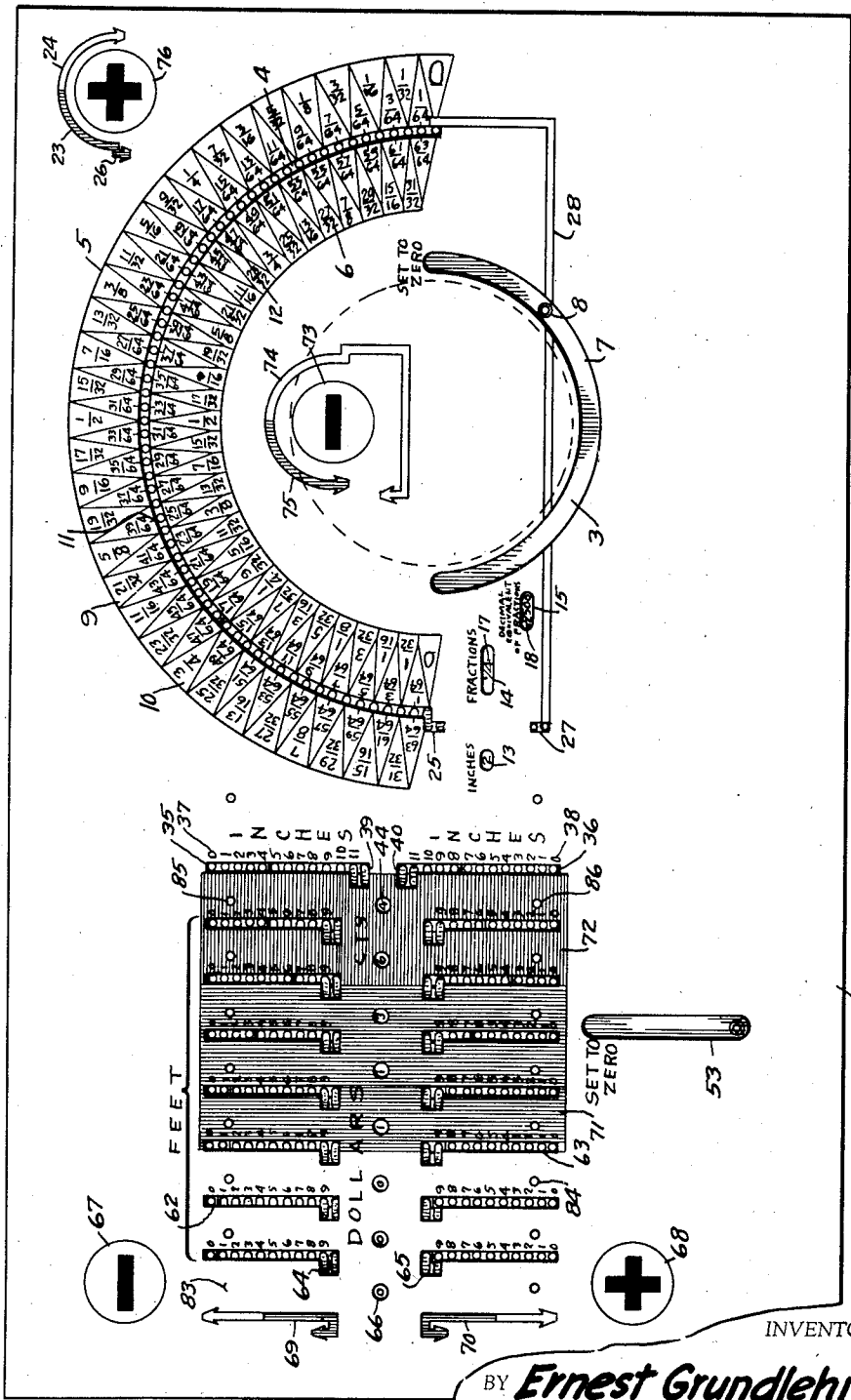


Fig. 1

Dec. 3, 1940.

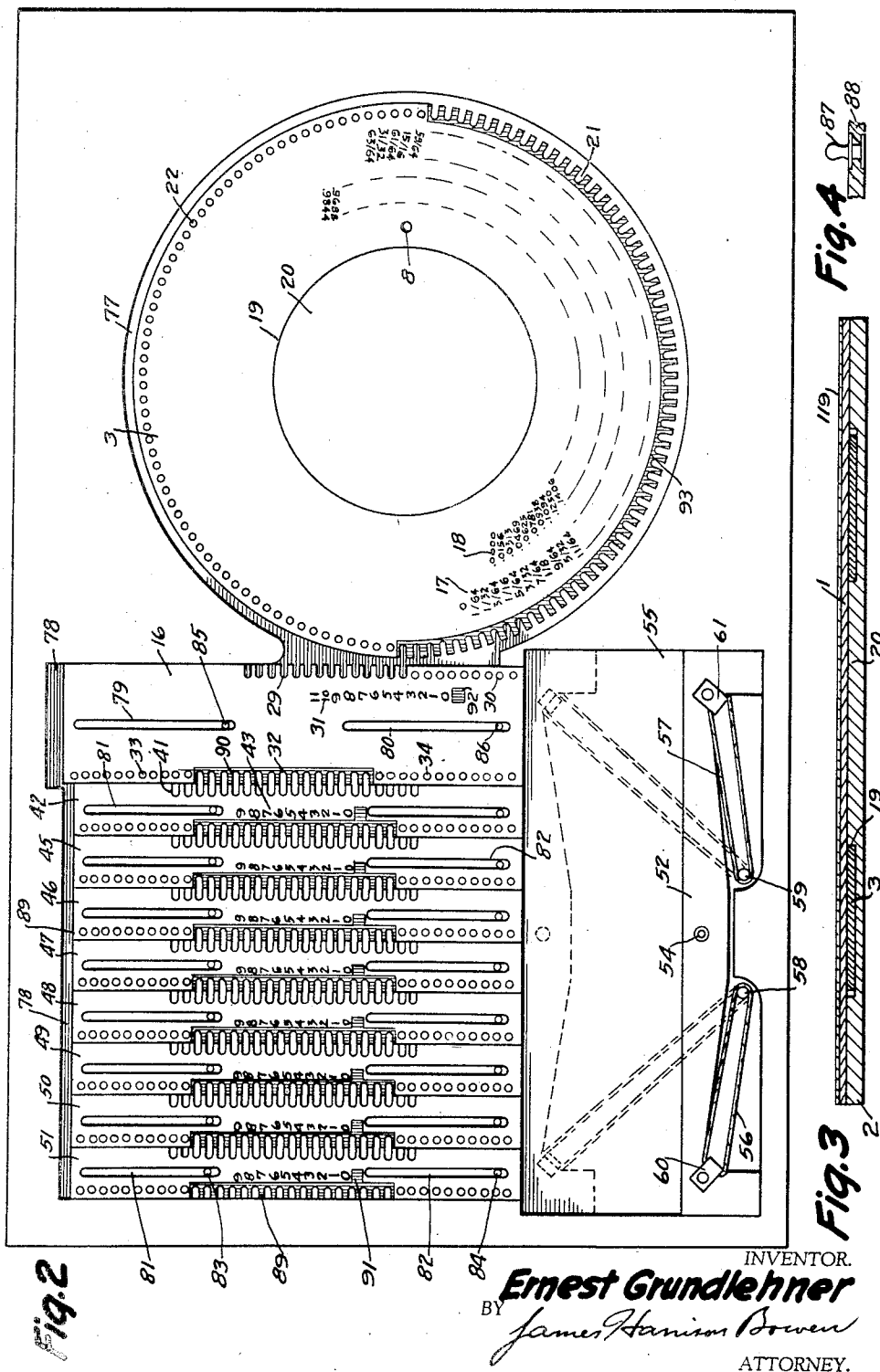
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5 Sheets-Sheet 3

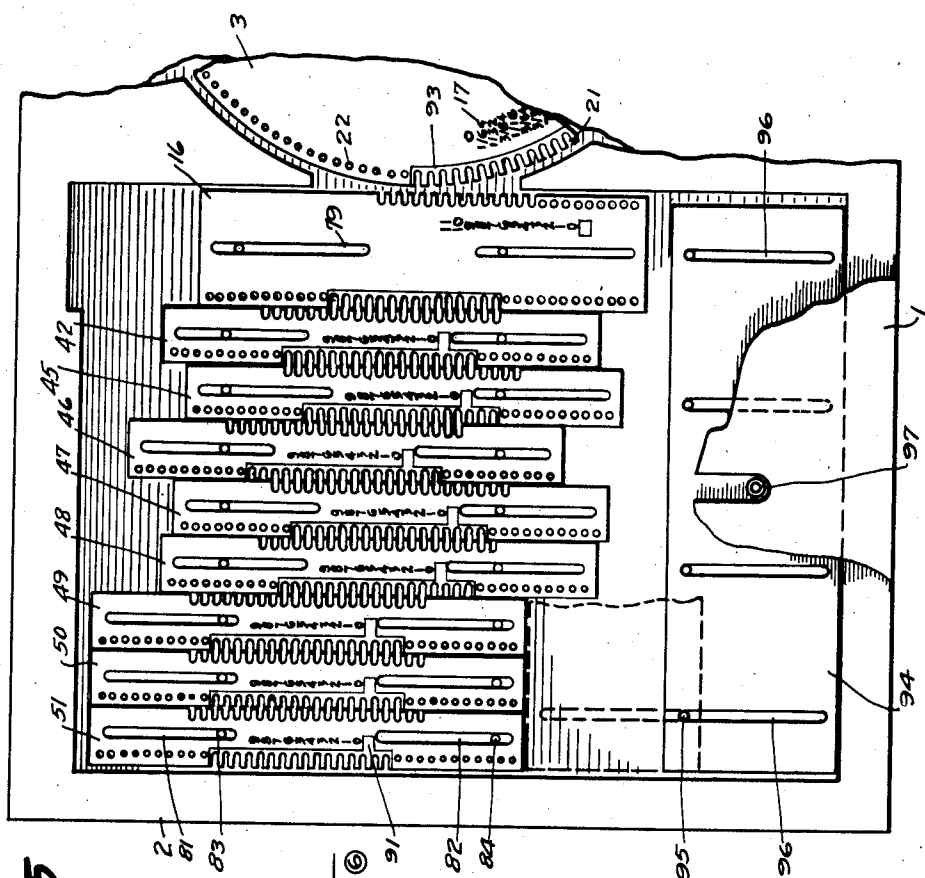
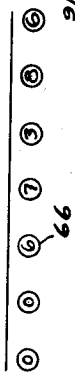


Fig. 5

Fig. 6



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5 Sheets-Sheet 4

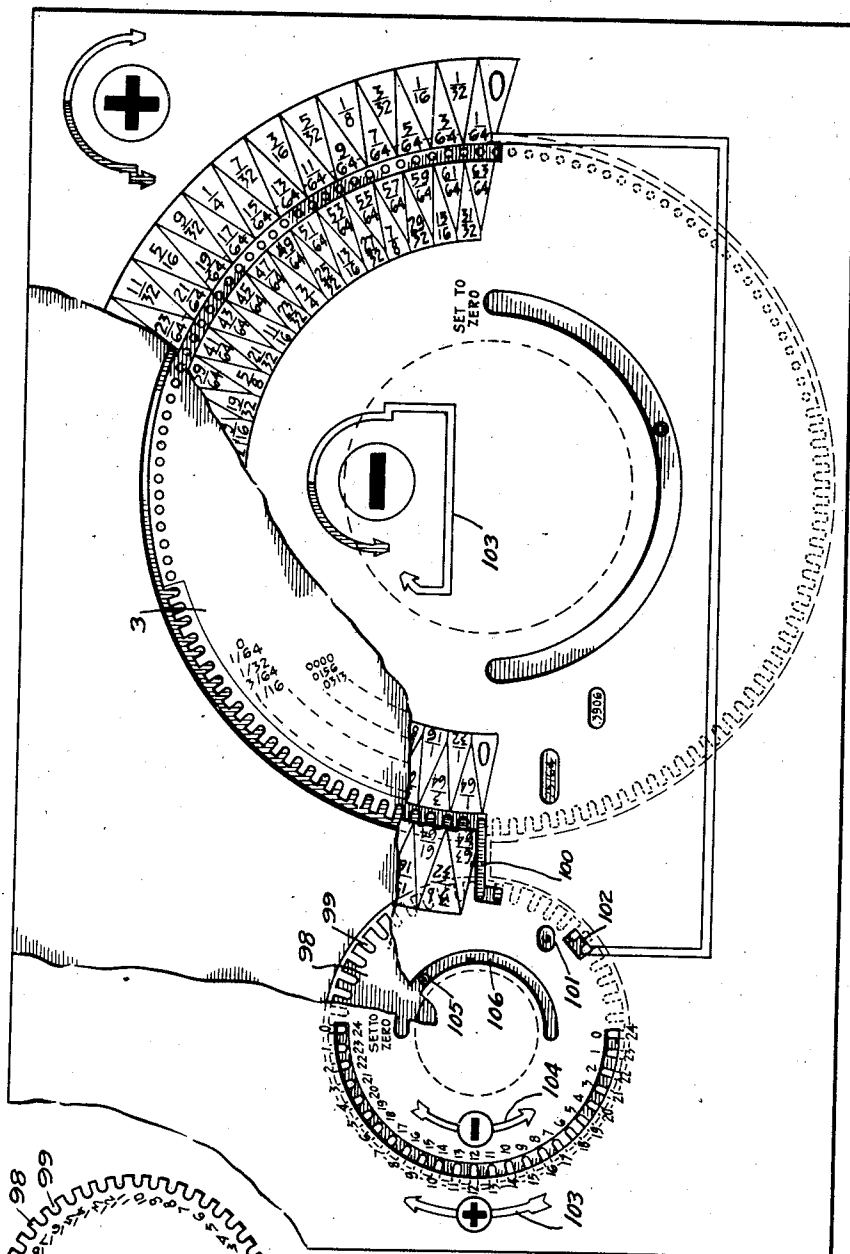


Fig. 7

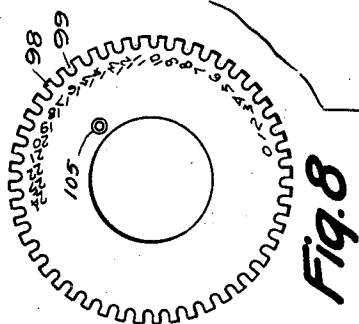


Fig. 8

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Fig. 9

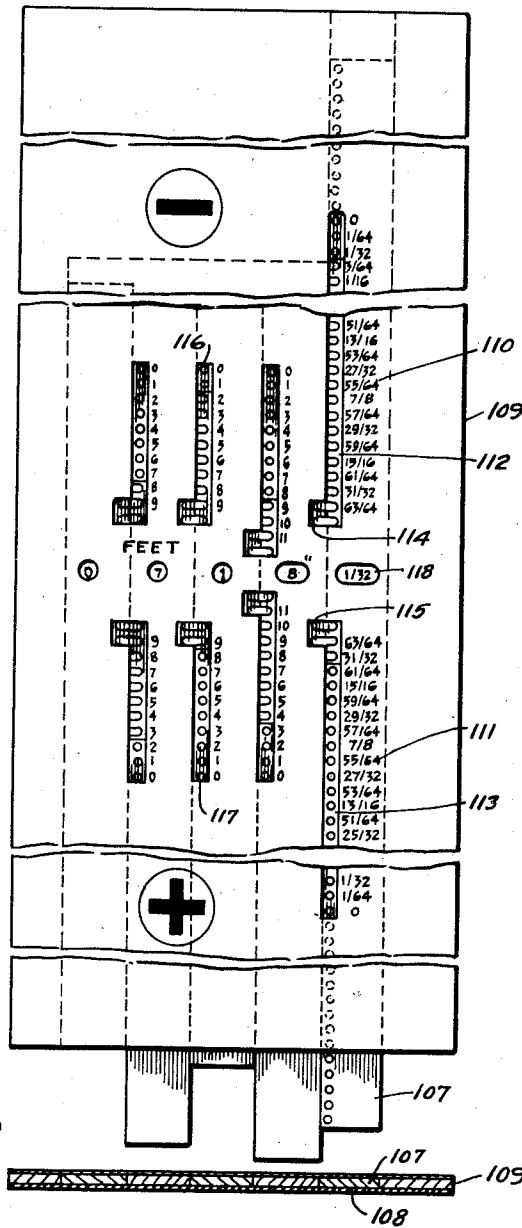


Fig. 10

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UNITED STATES PATENT OFFICE

2,223,612

ADDING MACHINE

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Application March 3, 1939, Serial No. 259,571

1 Claim. (Cl. 235—65)

The purpose of this invention is to provide a device for addition and subtraction which is particularly adapted to add or subtract fractions of inches.

5 The invention is a calculating device having a plurality of slides for addition and subtraction, and, in combination therewith, a rotary element with the fractions of an inch in combination therewith in which the rotary element may be
10 moved backward and forward to add and subtract the fractions in combination with the adding and subtracting means.

Sliding devices and also slide rolls have been provided for adding and subtracting numbers, 15 however, it is difficult with any device now in use to readily add and subtract the fractions of an inch without reducing the fractions to the decimal equivalent or by using logarithms, and, therefore, it has been found desirable to provide
20 a simple device with all of the fractions of an inch down to the sixty-fourths thereon which is arranged so that one may readily move an element and add or subtract any number of fractions, or add and subtract these fractions in combination with inches, feet and inches, or dollars
25 and cents.

The object of this invention is, therefore, to provide a relatively simple calculating device upon which fractions of an inch may readily be
30 added and subtracted.

Another object is to provide a chart in which the fractions of an inch may be added and subtracted which is relatively simple and compact, and which is readily understood.

35 Another object is to provide a device upon which the fractions of an inch may be added and subtracted in combination with feet and inches.

A further object is to provide means in combination with a device for adding and subtracting
40 fractions for readily explaining the operation thereof.

And a still further object is to provide a device for adding and subtracting fractions in combination with feet and inches which is of relatively simple and economical construction.
45

With these ends in view the invention embodies a relatively flat device comprising a base and a cover, with apertures in the cover, and with the fractions of an inch on one part thereof, and numerals indicating feet and inches and dollars
50 and cents on another part also with the directions thereon, and with slides and a rotating device mounted between the two parts, with means for returning the various elements to the starting position or setting the devices to zero.
55

Other features and advantages of the invention will appear from the following description taken in connection with the drawings, wherein:

Figure 1 shows a front view of the device with parts broken away. 5

Figure 2 shows the base of the device with the cover removed.

Figure 3 is a cross section through the device.

Figure 4 shows a button for operating some of the parts. 10

Figure 5 shows alternate means for setting the parallel sliders.

Figure 6 is a detail showing the openings 66 with the numbers showing therethrough, with the parallel sliders in the position shown in Figure 5. 15

Figure 7 is a view showing a device of an alternate design with two rotary members, and parts broken away, in which the parallel sliders are replaced by a rotary member adapted to be used in combination with the large disc. 20

Figure 8 shows the small rotating member of Figure 7.

Figure 9 shows the large rotating disc replaced by a long sliding member.

Figure 10 shows a section through the device 25 shown in Figure 9.

In the drawings the device is shown as it may be made, wherein numeral 1 indicates the top or cover, numeral 2, the base, and numeral 3, the rotary member between the cover and base. 30

The cover 1 is provided with a substantially semi-circular slot 4, with the fractions of an inch to be used for addition in an area 5 above the slot, and the fractions to be used for subtraction in an area 6 on the inner side of the slot, and 35 below the center is a substantially semi-circular opening 7 by which the element 3 may be returned to the starting position which is referred to as zero, the element 3 being provided with an opening or button 8 which may be engaged by a
40 pointer or the finger as may be desired.

The areas 5 and 6 are, in the design shown, divided into triangular shaped spaces 9 and 10, however, it will be understood that these may be of any shape or design, and any desired 45 divisions may be provided around the slot. It will also be noted that division points 11 are provided between the apexes of the triangles in the upper section, and similar points 12 are provided in the triangles in the inner section. 50 Adjacent the fractions are openings 13, 14 and 15, and it will be noted that the number of inches on a slide 16 may be observed through the opening 13, the fractions, as indicated by the numeral 17, may be observed through the opening 14, 55

and the decimal equivalents of the fractions, as indicated by the numeral 18, may be observed through the opening 15. The element 3, which is in the form of a disc, is provided with a circular opening 19 through which it is rotatably mounted on a circular bearing plate 20 which distributes the sliding contact area, and distributes the holding means of the inner semi-circular sections of the cover. The outer edge of the element 3 is provided with openings and holes, as indicated by the numerals 21 and 22, the openings extending substantially over one-half of the disc and the holes 22 over the other half, making a total of 63 slots and 65 holes with the fractions to sixty-fourths of an inch. The area through which the openings 21 extend is colored red to distinguish this part from that having the holes, and directions are provided as indicated in the upper right hand corner of the device to indicate that the red section is to be moved toward the left, and the white section toward the right, as in the illustration in the upper right hand corner the part 23 is shown in red, and the part 24 in white. This diagram also shows a short section representing the slot 25 at the left hand end of the slot 4, and another short section 26, indicating that the pointer is to be moved over and down one notch when the sum of the fractions being added exceeds one, as hereinafter described.

Below the slot 25 is another short slot 27 connected to the opposite end of the groove 4 by a line 28, indicating that notches in the opening 27 are to be moved similar to those in the opening 25 when subtracting, using openings in the white area on the opposite side of the device.

The inches are provided on the slide 16, one edge of which is provided with openings 29 and holes 30 which correspond with the slots 25 and 27, and on the face of this slide are numerals from zero to 11, as indicated by the numeral 31, which are positioned to be observed through the opening 13 so that, as this slide is moved by placing a pointer in the slots 25 and 27, the figures 31 will show through the opening 13 and indicate whether one inch or more has been added or subtracted. On the opposite edge of the slide 16 are openings 32, with corresponding holes 33 and 34 above and below the openings, and these openings and holes register with slots 35 and 36, with numerals indicated by the numerals 37 and 38 positioned beside the openings and arranged to correspond with the openings 32 and holes 33 and 34, and it will be noted that when adding inches, such as adding five inches to a figure not larger than 6, the pointer may be placed in the opening corresponding with the numeral 5, and then moved downward so that five inches will be added to the number formerly showing through the opening 13, and, if the five inches are to be subtracted, the pointer is placed opposite the five in the slot 36 and moved upward. When adding figures larger than six to the figure five or to figures larger than five place the pointer in the slot 36 opposite the numeral five, as an illustration, and move the slider up to the end of the slot. Then place the pointer in the opening opposite the numeral seven, as an illustration, and move it up to the end of the slot, then across in the part 40 to a notch in the slider 42, and then down one notch. In subtracting repeat the operation using the slot 35, and move the pointer down, and after moving it down for the second number, move it across and up.

The slots 35 and 36 are also provided with notches 39 and 40 which correspond with openings 41 in the next slide 42, and this slide is provided with a row of numerals 43 corresponding with an opening 44, and this slide may be moved by placing the pointer through the extensions 39 and 40 at the ends of the slots 35 and 36, and moving it upward or downward the distance of one notch, thereby causing another foot or as many feet as desired to appear in the opening 44.

The device is also provided with a plurality of slides 45, 46, 47, 48, 49, 50 and 51 similar to the slide 42, and these may be operated in a similar manner, and, before starting to operate the device, all of these slides with the slide 16 are moved upward to zero, or to the starting position, by a slider 52 which is operated by placing a pointer through a slot 53 and into an opening 54 in the slider. This slider is slidably mounted in a space 55 below the upper slide, and is resiliently held by elastic bands 56 and 57, one end of which are held on pins 58 and 59, and the opposite ends of which are attached to the slider by clips 60 and 61. The slider may be moved upward by a pointer, and then the elastic devices will return it to the position shown in Figure 2. These sliders from 42 to 51 inclusive may be operated to add or subtract feet and inches, dollars and cents, or for any purpose by placing pointers in the slots 62 for subtraction and 63 for addition, and, when changing to the next figure, they may be operated by the short extensions 64 and 65. The numerals on the slides corresponding with the numerals 43 show through the corresponding openings, indicated by the numerals 66.

The device may also be provided with a minus sign, preferably in a red circle, indicated by the numeral 67, in combination with the upper set of slots, and a similar plus sign also in a red circle 68 below the lower set of slots, and at the ends of the slots are red and white lines 69 and 70, indicating the direction in which to move the slides. In order to readily distinguish the different openings, the area indicated by the numeral 71 may be colored red and that indicated by the numeral 72 blue to readily distinguish between feet and inches and dollars and cents.

The device may also be provided with a minus sign in a red circle, indicated by the numeral 73, which may also be red to indicate that the lower portion is for subtraction, and this may be surrounded by a diagram 74 having a red section 75 therein to indicate which direction to turn the member 3; and a plus sign may also be provided in a red circle 76 to readily indicate that the outer portion is for addition. The small areas in which the fractions are noted may also be colored with a different color for each denomination, and, in these areas, the halves and quarters may be red, the eighths blue, the sixteenths green, and the thirty-seconds white and the sixty-fourths yellow. It will be understood that any color may be used for any denomination.

In construction, the disc 3 is rotatably mounted on the inner disc 20 in an opening 77, and the slides are mounted in an opening 78, with the slider 52 in the opening 55 below the opening 78, and the individual slides are provided with upper and lower slots 79 and 80 in the slide 16, and 81 and 82 in the slides 42 and 45 to 51 inclusive, and these slides may be mounted upon

pins 83 and 84, with the slide 16 mounted on pins 85 and 86.

The member 3 and also the slider 52 may be provided with openings, as shown, however, it will also be understood that these may be formed with small, narrow buttons 87 that may be mounted in the material of the member indicated by the numeral 88, so that the buttons may extend through the slots 7 and 53, however, it will be understood that any means may be provided for operating these parts through the upper part of the device.

The slides 42 and 45 to 51 are colored red in the area indicated by the numeral 89, the slide 16 is colored red in the area indicated by the numeral 90, and these red areas extend inward below the zeros at the points 91 and 92. The element 3 is also colored red in the area indicated by the numeral 93, and, when these red areas appear in the openings or opposite the numerals to be added or subtracted, the direction of movement is reversed, as will be noted by the diagrams adjacent the respective parts of the device. It will also be noted that, when the blank red areas 91 or 92 appear in the windows 66, 44, or 13, zero is to be subtracted and the pointer is to be placed in the notch opposite the zero and moved downward the full length of the slot, and when blank white areas appear, in these windows, zero is to be added, by placing the pointer in the notch opposite zero and moving it upward the full length of the slot.

In Figure 5 a slide 94 is illustrated which is somewhat similar to the slide 52 except that the elastic bands are omitted, and, in this design, the slide is mounted upon pins 95 which extend into slots 96, and the slide is provided with an eyelet 97 by which it may be readily moved upward and downward by a pointer or the like. This slide may also be provided with elastic bands or other returning means.

In the design shown in Figure 7, the parallel sliders are replaced by a rotary member 98 with slots 99 in the edge to correspond with the slots in the disc 3, and, in this design, the fractions may be added or subtracted with the disc 3 as hereinbefore described, and, when the total exceeds one inch, the pointer may be moved across a slot 100, and then downward one notch, adding one to the numeral shown in the window 101, or, in subtracting, the pointer is placed in the slot 102, as indicated in the diagram 103 in the center of the device and moved upward, thereby subtracting one from the numeral showing through the opening 101.

The device may be provided with indicating diagrams 103 and 104 or other directions for operating, and the disc 98 is provided with a button or opening 105 in a slot 106 by which it may be returned to zero.

In the design shown in Figure 9, the rotating member 3 is replaced by an elongated slide 107 in a slot 108, and on the upper part of the board 109 are the fractions 110 to be used for subtraction and on the lower part the fractions 111 to be used for addition. This board is provided with slots 112 and 113 corresponding with openings and slots in the edge of the member 107 through which the slide may be moved upward or downward with a pointer or the like, and at the ends of the slots are notches 114 and 115 by which the next slider corresponding to the slider 16 may be moved the distance of one notch upward or downward to add or subtract, and as many sliders as may be desired may be used

in the following slots indicated by the numerals 116 and 117 as may be desired. These sliders may be exactly similar to the sliders illustrated in Figures 1 and 2, and any number of sliders may be used. The board 109 is provided with a window 118 corresponding with the window 14 in the device shown in Figure 1 through which the fractions may be seen as the device is operated, and the slider 107 may have a colored area over the slots similar to that shown on the disc 3 in Figure 2 and indicated by the numeral 93.

The device of this design and also of the design shown in Figures 1, 2 and 3, may be covered with a thin sheet of Celluloid as indicated by the numeral 119 shown in Figure 3.

It will be understood that changes may be made in the construction without departing from the spirit of the invention. One of which changes may be in the use of other means for noting the fractions around the traveling element, another may be in the use of other means for moving the different parts, another may be in the use of the device for only a few fractions, making it possible to reduce the size, another may be in the use of a portion of the device upon which the fractions are shown independent of the other parts, also making it possible to provide a relatively small, unique device, and still another may be in the use of this device for any other purpose.

The construction will be readily understood from the foregoing description. In use the device may be provided as shown and described, and, before starting any operations, all figures should be set to zero by moving the opening or eyelet 54 upward in the slot 53, and moving the opening or eyelet 8 all the way to the right in the slot 7, so that it is in the position noted "set to zero."

Then, when it is desired to add numerals, such as 25 and 41, place a pencil or pointer opposite the numeral 5 in the first one of the slots 63, and move it down to the end of the slot, then place the pointer in the opening opposite the numeral 2 in the next column, and move it downward. The openings 44 and 66 will then show "25." Then place the pointer back in the column 63 opposite the numeral 1, and move it downward and place it opposite the 4 in the next slot, and move it downward, and then the opening 44 and the last one of the openings 66 will show the result "66." After completing addition or subtraction, always move the slides back to zero by placing the pointer in the slot 53 and moving the eyelet therein upward. To add 58 and 87, move 8 in the first of the columns 63 downward, 5 in the next column downward, and then, as the opening opposite the numeral 7 is red, this should be moved upward, as noted in the diagram shown at the end of the columns, and then across and downward one notch, also as indicated by the diagram. Then place the pointer opposite the numeral 8 in the second of the columns 63, and, because this is red, also move this up, then step the pointer across and move it down one notch which will cause the numeral 145 to show in the last two of the openings 66, and the opening 44.

When adding numbers in which the result is over 100, such as 94 plus 6, you move the 4 and 9 down, as in the former example, and then add the 6, and, as the slot is then in the red area, the pointer should be moved upward to the end of the slot, then over to the left, and then down

the position of one figure. In the second opening, there will be a white blank, and whenever there is a white blank in a window, it is necessary to add the zero in that particular row of numbers, and, therefore, place the pointer into the slot adjacent the zero, and because this slot is also in the red area, it must be moved upward to the end, then over, then downward one notch. When adding a column of figures, such as:

10	145.55
	92.63
	51.91
	18.76
15	308.85

start adding the first figure, the 6 in the cent column, then the 1 in the cent column, then add each figure as illustrated above, completing the cent column, then the tens, then the dollars, etc., moving the white holes down and the openings in the red areas up and across, as described above. To add the fractions, such as $\frac{1}{8}$ to $\frac{1}{4}$, place the pointer in the slot 4 opposite the $\frac{1}{8}$ in the outer row of fractions, and move this downward to the end, and then place the pointer in the opening adjacent the $\frac{1}{4}$ and move this downward to the end, moving both in a clockwise direction, and in the window 14, the sum, such as $\frac{3}{8}$, may be observed, and in the window 15 the decimal equivalent thereof.

Whenever the area to which the pointer is to be placed is red, the disc should be moved in a counter-clockwise direction, and then across the slot 25 and downward the distance of one notch, thereby adding one inch, and the one will appear in the opening 13.

The same process is repeated for subtraction, except that the fractions in the lower area are used and lower diagrams executed, and one may continue to add inches and feet, using the sliders below the parallel slots 35 and 62.

It will be noted that both the disc and sliders are provided with combinations of holes and

slots, and this facilitates operating the device, as when the pointer, moving in a counter-clockwise direction, reaches the end of the slot 4, it may readily slide across the slot and into a corresponding slot in the slider, so that this may be moved downward without removing the pointer from the device. This also facilitates operation of the parallel sliders through the slots 62 and 63 because the pointer may readily be moved across the extensions 64 and 65, and then upward or downward without removing the pointer from the slot; and, at the same time, this combination of holes and slots prevents mistakes because, if the pointer will not move across, the operator is warned that he has made a mistake.

Having thus fully described the invention, what I claim as new, and desire to secure by Letters Patent, is:

A manually operated calculating device comprising a flat base member having recesses in the upper surface, a cover having operating and display openings therein, a disc having open slots in a portion of the edge thereof and holes in the remaining portion adjacent the edge, said disc rotatable in one of the recesses of the base and positioned with the open slots and holes registering with an operating opening of the cover, and a slider adjacent the disc and in a recess of the base, also having open slots and holes in an edge thereof positioned with the open slots and holes registering with an operating opening in the cover with the said operating opening of the slider connecting with the adjacent end of the operating opening of the disc, said disc having fractions of an inch thereon positioned to show through a display opening in the cover and said slider having numbers thereon also positioned to show through a display opening in the cover, said device characterized by alternately positioned triangular shaped areas adjacent the operating slot of the disc in which the fractions of an inch are located, said areas registering with the open slots and holes of the disc.

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