

Sept. 19, 1944.

O. E. BATORI

2,358,309

SLIDE RULE

Filed Aug. 2, 1941

3 Sheets-Sheet 1

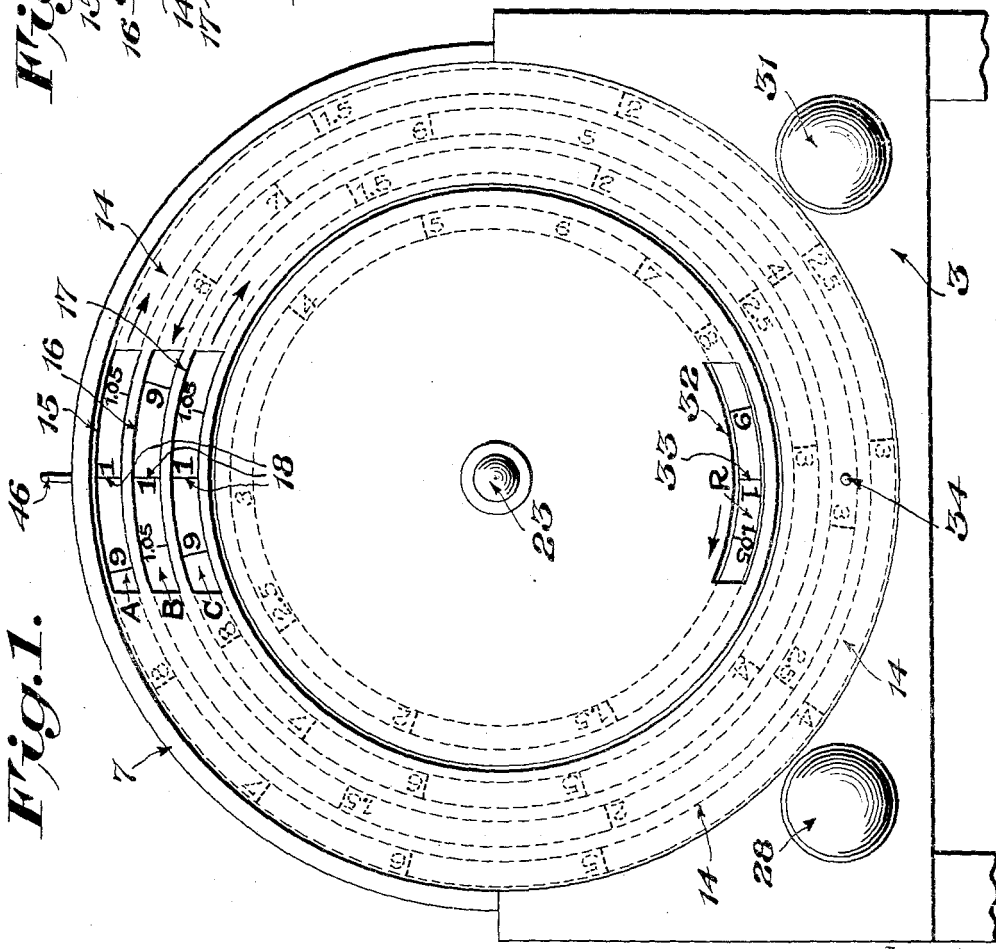
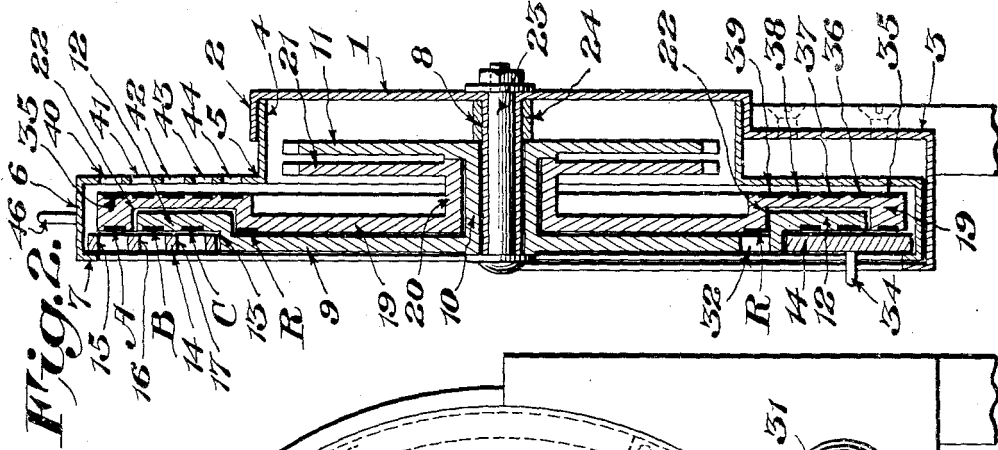


Fig. 1.

Fig. 2.

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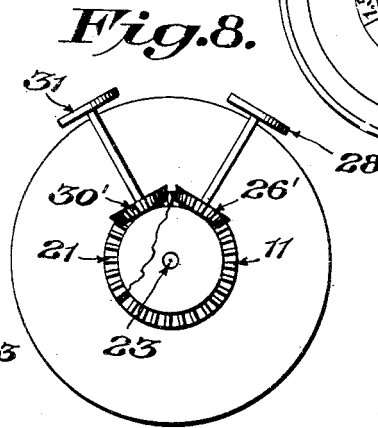
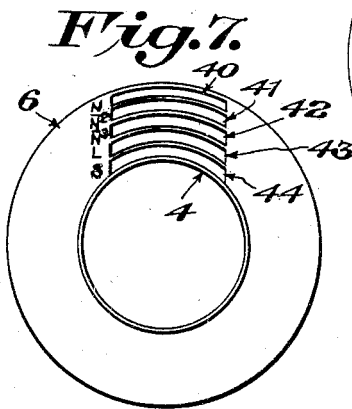
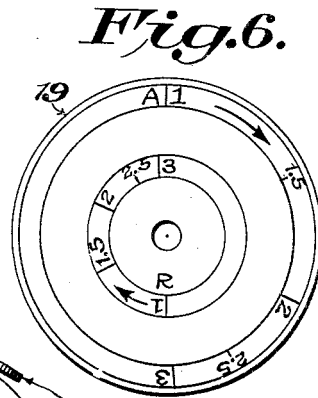
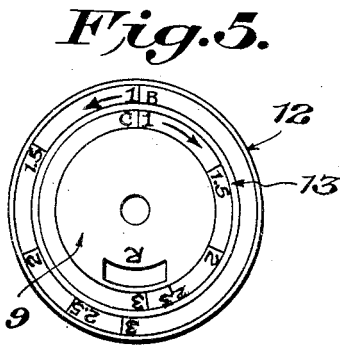
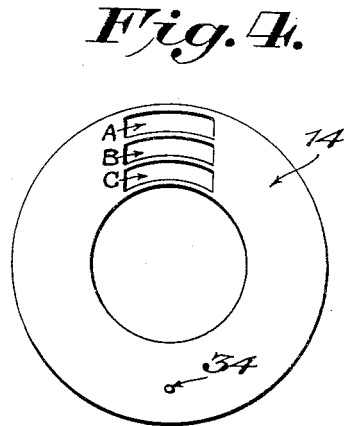
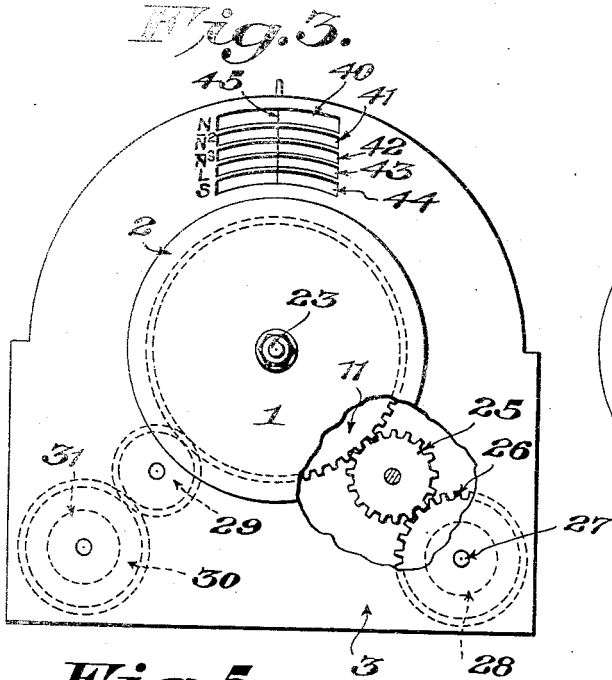
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SLIDE RULE

Filed Aug. 2, 1941

3 Sheets-Sheet 2



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Filed Aug. 2, 1941

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Fig. 9.

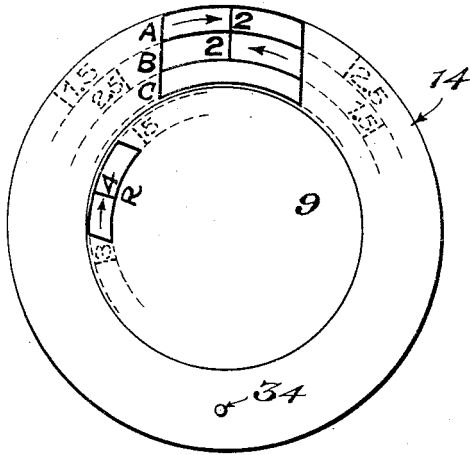


Fig. 10.

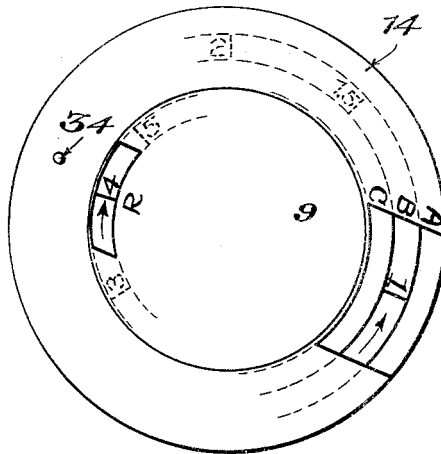


Fig. 11.

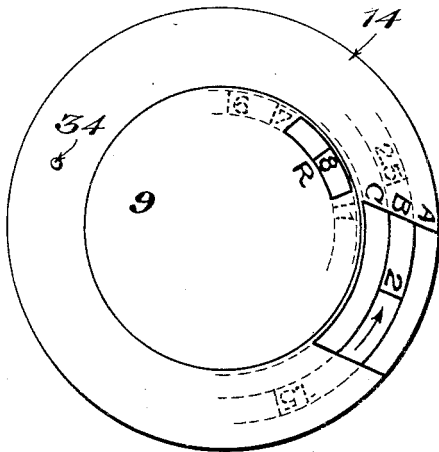
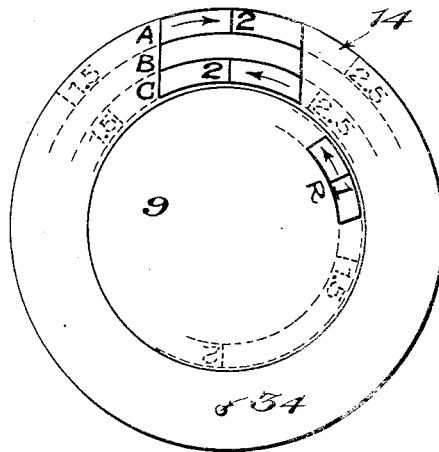


Fig. 12.



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UNITED STATES PATENT OFFICE

2,358,309

SLIDE RULE

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Application August 2, 1941, Serial No. 405,235

1 Claim. (Cl. 235—84)

This invention relates to calculating instruments of the slide rule type, and has been embodied in circular form and includes a series of rotatably settable dial members carrying data in such an arrangement that the various calculations of multiplication, division, or other functions, may be accomplished in a simple and expeditious manner.

It is an important object of the invention to provide for independent and simultaneous as well as successive setting of the dial members so as to expedite and simplify the operation of the instrument in obtaining any desired arithmetical or other result.

Another important object of the invention is to provide for maintaining the several scales separate from each other so as to simplify the use of the instrument.

A further object is to embody the invention in such form which will enable the manipulation of the parts of the instrument for setting the settable parts and for bringing the results of the calculations to view in a simple and convenient manner.

With these and other objects in view, the present invention consists in the combination and arrangement of parts, as will be hereinafter more fully described and illustrated in the accompanying drawings, and particularly pointed out in the appended claim, it of course being understood that changes in the form, proportion, size and minor details may be made, within the scope of the claim without departing from the spirit or sacrificing any of the advantages of the invention.

In the drawings—

Figure 1 is a front elevation of a calculating device or rotary slide rule embodying the features of the present invention.

Figure 2 is a central vertical sectional view of Figure 1.

Figure 3 is a rear elevation of Figure 1, on a smaller scale, parts being broken away to show operating portions.

Figure 4 is a front elevation on a smaller scale, of the fixed indicator member.

Figure 5 is a front elevation, on a smaller scale, of the rotatably settable slide member of the device.

Figure 6 is a front elevation, on a smaller scale, of the rotatably settable base member.

Figure 7 is a rear elevation, on a smaller scale, of one of the housing members.

Figure 8 is a diagrammatic view of a modified

form of means for rotatably setting the base and slide members.

Figure 9 is a diagrammatic view illustrating the manner of using the instrument in multiplying two numbers.

Figures 10 and 11 are similar views illustrating successive steps in the using of the instrument in multiplication where more than two factors are used.

Figure 12 is a similar view illustrating the manner of using the instrument in division.

The operating parts of the present invention are housed and mounted within a housing or casing including a fixed back member 1 of circular form having a forwardly directed marginal and cylindrical flange 2, from the bottom portion of which depends a base member 3 on which the housing may normally rest or be otherwise supported in a fixed position. There is also a front housing portion including a cylindrical member 4 which fits within the flange portion 2 and projects forwardly therefrom, and fits snugly enough within the part 2 to normally maintain the housing portion 4 fixed, while at the same time the part 4 may be manually rotated upon the part 2 for a purpose as will hereinafter appear.

At the front of the cylindrical portion 4 there is a marginal ring portion 5 which extends outwardly a suitable distance and is provided at its outer edge with a forwardly directed rim 6 terminating at its front edge in an inwardly directed flange 7. At the center of the part 1 there is an open ended tubular member 8 extending forwardly from the part 1 and on which the movable parts of the device are rotatably mounted.

The slide member of the present device is in the form of a disc 9 provided with a central hub 10 rotatably mounted upon the tubular post 8 and provided at its inner or rear end with a gear 11. The outer margin of the part 9 is offset rearwardly as at 12, so as to provide an annular groove or rabbet 13 in the front face of the member 9 so that there may be accommodated therein the rotatable indicator member 14, which is in the form of a ring that is provided with a series of three arcuate openings 15, 16, and 17, through which data or scales may be viewed. These slots or openings constitute an indicator or indicators, and each is provided with a hair line 18 extending diametrically across the opening midway between the ends thereof. The fixed indicator ring 14 lies between the back of the groove 13 in the slide member 9 and the flange 7 on the housing and is thereby effectually held in place. In rear of the slide member 9

is the base member 19 in the form of a disc having a hub 20 rotatably mounted upon the hub 10 and provided at its inner or rear end with a gear 21 lying in front of and parallel with the gear 11 and of the same size. In the front face of the base member 19 and near the outer margin thereof there is a marginal groove or recess 22 which accommodates and receives the rearwardly offset outer marginal edge portion of the slide member 9. It will here be noted that the ring 14 is accommodated within the slide 9, and the rearwardly offset portion of the slide 9 is accommodated within the base member 19, whereby the parts are assembled in a compact arrangement and occupy a minimum of space in a direction front and rear of the instrument. A suitable bolt 23 extends through the hollow post 8 so as to prevent forward displacement of the members 9 and 19. A sleeve or bushing 24 embraces the tubular post 8 so as to space the hub 10 away from the back 1 of the casing to hold the forward end of the hub against the bolt. Any other suitable means or arrangements may be made to maintain the members 9 and 19 in their proper relation within the casing.

For convenience in rotatably setting the parts 9 and 19, there may be provided means such as has been shown in Figure 3 of the drawings and including a gear 25 in mesh with the gear 11 and also with the gear 26 on a shaft 27 extending through the front of the casing and there provided with a knob or handle 28 for manually turning the gear 26 to rotatably adjust the member 9. A similar set of gears 29 and 30 and a knob or handle 31 of the same size and relation, may be provided for rotating the gear 21 and its attached member 19. By this arrangement, the members 9 and 19 may be independently rotated either successively or simultaneously, as may be desired.

On the front face of the base member 19 near the outer periphery thereof, there is provided a logarithmic scale in circular arrangement with its main divisions numbered from 1 to 10 and subdivided, although the subdivisions have not been shown on the drawings. On the front face of the outer peripheral portion of the member 9 is a logarithmic scale B in circular arrangement with its main divisions numbered from 1 to 10, but in inverted order as to scale A. Another circular logarithmic scale C is also provided upon the front face of the member 9 and numbered from 1 to 10 and subdivided and inverted with respect to the scale B. The scales A, B and C are identical, except that the scale B is inverted with respect to A and C. It will of course be understood that the scales A, B and C are concentrically arranged and their divisions are radially disposed. It will now be explained that the openings 15, 16 and 17 in the fixed indicator 14 are in alignment with the respective scales A, B and C, so as to expose to view such portions of the scales as may be in alignment with the openings.

On the front face of the base member 19 is a circular logarithmic scale R which is numbered from 1 to 10, as in the other scales, and subdivided, and this scale is intended to give the result of the arithmetic calculation desired for both multiplication and division. The scale R is covered from view by the member 9, except where it is exposed through the indicator opening 32 in the member 9. It will here be noted that the base scale A and the result scale R are carried by the same member 19 and of course slide or

rotate simultaneously therewith. By reference to Figure 1 of the drawings, it will be seen that the numeral 1 of base scale A and the numeral 1 of the result scale R have been shown diametrically opposite, and that the numerical succession in each scale is the same. The opening 32 is provided with a hair line 35 disposed radially as in the other indicator openings 15, 16, and 17, and cooperates with the result scale R.

In illustration of the manner of using the present invention for multiplication purposes, for instance for multiplying 2 by 2, reference is had to Figure 9 of the drawings, wherein it will be seen that the base member 19 has been rotated in a counterclockwise direction by manipulation of the knob or handle 28 to bring the numeral 2 of the scale A into alignment with the hair line of the indicator opening A, and the slide member 9 has been rotated in a clockwise direction by manipulation of the knob or handle 31 to bring the numeral 2 of scale B in alignment with the hair line of opening 16, whereupon it will be found that the indicator opening 32 in the member 9 has been moved in a clockwise direction and the numeral 4 of the result scale R will then appear in alignment with the hair line 33, giving the desired result of the multiplication of 2 by 2, which equals 4. It will here be noted that the members 9 and 19 may be rotatably set successively or simultaneously by the manipulation of the knobs or handles 28 and 31. It will here be noted that scale C is not employed in the process of multiplication.

Where three factors are employed in multiplication, as for instance $2 \times 2 \times 2$, the first step of the operation will be as hereinbefore described and as shown in Figure 9. The next step, as shown in Figure 10, wherein it will be seen that the rotatable indicator ring 14, by means of its handle 34, is rotated until the numeral 1 on scale B appears through the indicator opening 16 at the hair line 18 thereof, and then the member 9 is rotated by manipulation of the handle 28, until the numeral 2 on scale B appears at the hair line 18 through opening 16, whereupon it will be found that the indicator opening 32 has been moved around to a position where the number 8, which is the desired result, appears at the hair line 33 across the opening 32. It will here be noted that the manipulation which brings the third factor into view through the indicator opening 16, simultaneously and automatically moves the result indicator opening 32 into its ultimate position to display the desired result. Here again it will be noted that the scale C is not employed during the steps of multiplication.

In illustration of the manner of using the present instrument for the calculation of division, for instance, in dividing 2 by 2, reference is had to Figure 12 of the drawings, wherein it will be seen that the member 19 has been rotated in a counter-clockwise direction to bring the numeral 2 of scale A in alignment with the hair line of the indicator opening 15 by manipulation of the handle 31. Then, by manipulation of handle 28, the member 9 is rotated to bring the numeral 2 of scale C at the hair line 18 of the indicator opening 17, whereupon it will be found that the result opening 32 has been moved automatically and simultaneously to a position where the numeral 1, or the desired result, appears through the result opening 32.

While I have described a successive operation by manipulation of the handles 28 and 31, it will be understood that these operations may be si-

multaneous rather than successive. Also, it will be noted that in the operation of division, scale B is not employed. In division operations involving three or more factors, ring 14 is reset as described for multiplication, except that it is reset with respect to scale C.

On the back of the base member 19 there has been provided a plurality of concentric scales designated 35, 36, 37, 38, and 39, and the housing or casing member 5 has been provided with a plurality of arcuate slots or openings 40, 41, 42, 43, and 44, in register with and through which the respective scales may be viewed, each of said openings being provided with a hair line 45, Figure 3. The outermost scale 35 is identical with scale A on the front of the member 19, so that identical numbers are displayed through the front indicator opening 15 and the rear indicator opening 40. The scales 36, 37, 38, and 39 give the square, the cube, or any other power or function of the number of the scale 35 which is exposed through the opening 40, and thus any of these desired results may be obtained by rotating the member 19 to bring the desired initial number on the scale 35 into alignment with the indicator opening 40 by manipulation of the knob or handle 31. It will of course be understood that the scale 35 reads in a counter-clockwise direction with respect to scale A, so that identical numerals will appear simultaneously through the front indicator opening 15 and the rear indicator opening 40.

In Figure 1 of the drawings, it will be noted that the numerals on result scale R which are exposed through the indicator opening 32, at this position, appear upsidedown, and for convenience in reading these figures, the entire instrument may be rotated upon its mounting on the fixed housing member 1 by manipulation of the handle 46 provided upon the part 6 of the rotatable housing member.

Instead of employing a ring member 14 wide enough to cover and conceal the scales A, B, and C, as shown in the drawings, the ring may be narrow enough to expose the full extent of

the scales, and instead of hair lines 18, an indicator in the form of a pointer may be provided upon the ring and extending radially across the scales A, B, and C.

Also, the slot or opening 32 may extend entirely around the member 9 and the concentric parts of member 9 connected across the slot, a suitable pointer instead of a hair line, being provided upon the part 9 and in cooperative relation with the result scale R.

While the initial point of scale R and the opening 32 have been shown diametrically opposite the initial point of scales A, B, and C, it will be understood that the initial point of scale R and the opening 32 may have any other desired position.

I claim:

In an instrument of the class described, the combination of a rotatable base dial member having an annular recess in the front face thereof, a base logarithmic scale disposed in a circle on the front face of the base dial member and located between the recess and the outer margin of the base dial member, a logarithmic result scale disposed in a circle on the front face of the base dial member and between the recess and the center of the base dial member, a rotatable dial in front of and concentric with the base dial member and of smaller diameter than the base dial member and having a rearwardly offset annular portion received within the annular recess of the base dial member, inversely arranged logarithmic scales in circular form and concentric with the smaller dial and on the front face of the said offset portion, the smaller dial being provided with an opening in alignment with the result scale on the base dial member to expose to view a portion thereof, and a rotatable indicator ring in front of the scale at the outer margin of the base dial member and the inversely arranged logarithmic scales on the smaller dial and provided with indicator openings in alignment with said scales to expose to view portions of said scales.

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