

March 11, 1941.

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2,234,896

TRIGONOMETRIC IDENTIFIER

Filed Feb. 21, 1940

2 Sheets-Sheet 1

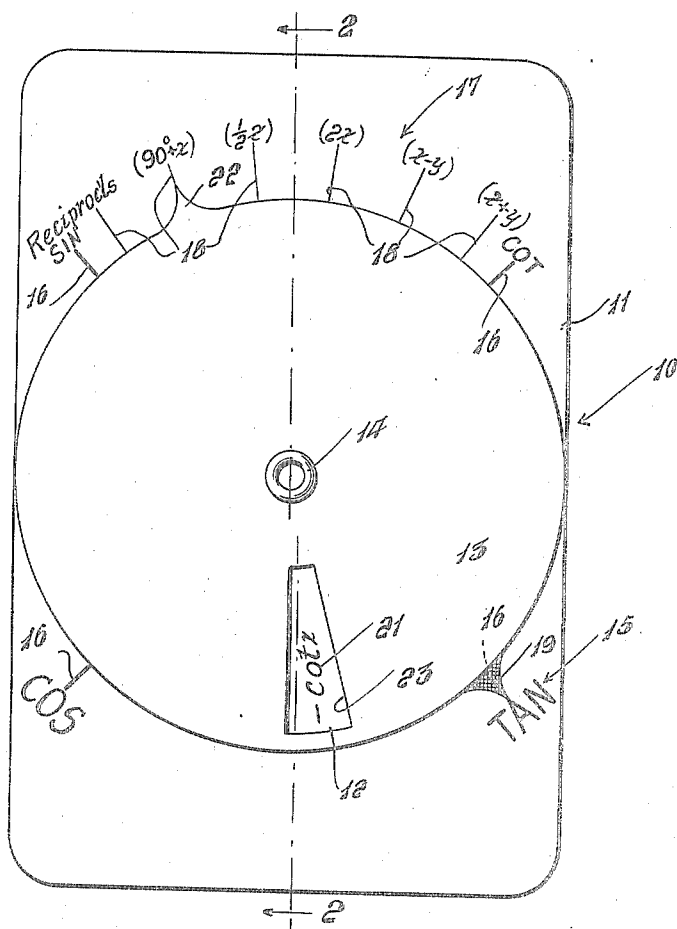


Fig. 1.

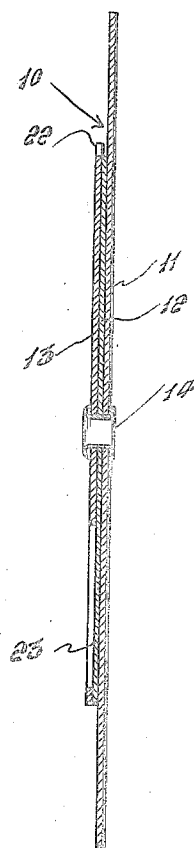


Fig. 2.

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Fig. 3.

$$\begin{aligned} \sin A \csc A &= 1 \\ \cos A \sec A &= 1 \\ \tan A \cot A &= 1 \\ \sin^2 A + \cos^2 A &= 1 \\ \sec^2 A - \tan^2 A &= 1 \\ \csc^2 A - \cot^2 A &= 1 \end{aligned}$$

Law of Sines $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Law of Cosines $a^2 = b^2 + c^2 - 2bc \cos A$
 $b^2 = a^2 + c^2 - 2ac \cos B$
 $c^2 = a^2 + b^2 - 2ab \cos C$

Law of Tangents $\frac{\tan \frac{1}{2}(A-B)}{\tan \frac{1}{2}(A+B)} = \frac{a-b}{a+b}$
 $\frac{\tan \frac{1}{2}(B-C)}{\tan \frac{1}{2}(B+C)} = \frac{b-c}{b+c}$
 $\frac{\tan \frac{1}{2}(C-A)}{\tan \frac{1}{2}(C+A)} = \frac{c-a}{c+a}$

Fig. 4.

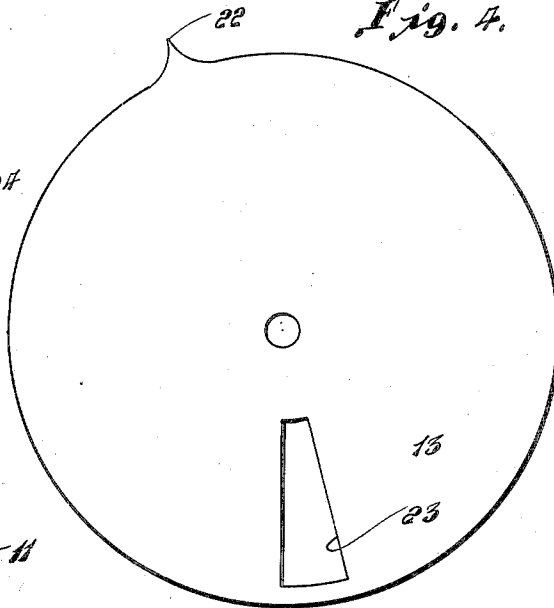
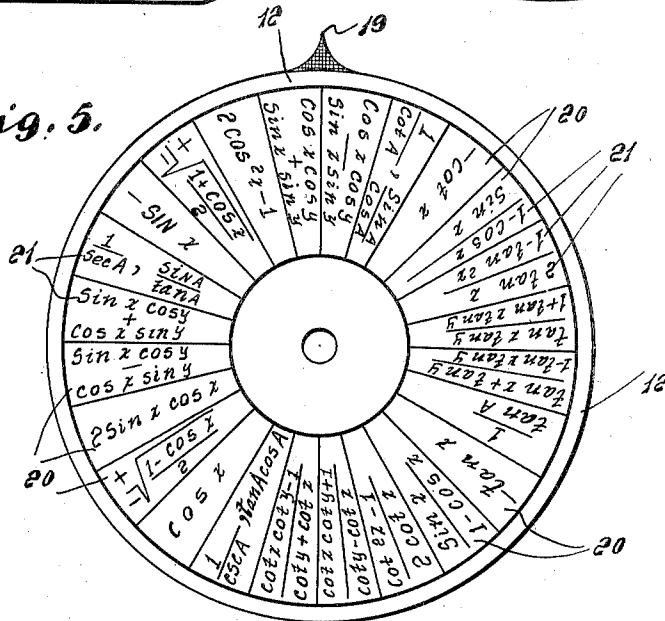


Fig. 5.



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UNITED STATES PATENT OFFICE

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TRIGONOMETRIC IDENTIFIER

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3 Claims. (Cl. 35-74)

This invention relates to a device constituting an indicator capable of being readily adjusted for giving identities to functions of angles in the study of trigonometry.

5 More particularly, it is an aim of this invention to provide a mechanism especially designed and adapted as an aid to students in the study of trigonometry and higher mathematics for quickly identifying the functions of angles by means of simple manipulation of the mechanism to thereby avoid the loss of time resulting in locating the same information in text books.

10 Still another aim of the invention is to provide a mechanism of simple construction capable of being economically manufactured and sold, and which may be readily operated for indicating the functions of angles.

15 Still another aim of the invention is to provide a mechanism of the character, as heretofore explained, on the reverse side of the base portion of which is adapted to be provided indicia including the law of sines, cosines, and tangents and a number of helpful equantities.

20 Other objects and advantages of the invention will hereinafter become more fully apparent from the following description of the drawings, which illustrate a preferred embodiment thereof, and wherein:

30 Figure 1 is a top plan view of the device, Figure 2 is a longitudinal vertical sectional view taken substantially along the plane of the line 2-2 of Figure 1,

Figure 3 is a bottom plan view of the device, Figure 4 is a top plan view of the upper disk, 35 and

Figure 5 is a similar view of the lower disk.

Referring more particularly to the drawings, wherein like reference characters designate like or corresponding parts throughout the different views, 40 10 designates generally the indicator which includes a base member 11 and disks 12 and 13. Disks 12 and 13 are superimposed on the base 11 and rotatably connected thereto and to one another by a ferrule or other fastening 14 with the disk 13 above the disk 12. Disks 12 and 13 are 45 of substantially the same size, while the base 11 is substantially larger than the disks and may be of any desired shape.

The base 11, as best seen in Figures 1 and 2, on its exposed upper surface is provided with four 50 equally spaced component parts of one set of indicia, designated generally 15. The parts of the indicia 15 each include a corresponding calibration line 16 which extends radially from the 55 peripheries of the disks 12 and 13, which lines

are marked respectively "sin," "cot," "tan" and "cos," being abbreviations of sine, cotangent, tangent and cosine, respectively. The base 11 is also provided with a second series of indicia, designated generally 17 and comprising six parts 5 which are equally spaced relatively to each other and which are disposed between two of the calibration lines 16, of the indicia 15, as illustrated, between the lines designated "sin" and "cot." However, the series of indicia 17 could obviously 10 be disposed between other pairs of the calibration lines 16, if desired. The indicia 17 includes six equally spaced calibration lines 18 which project radially from the peripheries of the disks 12 and 13 and which are marked respectively, reading in a clockwise direction, "Reciprocal's," " $(90^\circ + x)$," " $(\frac{1}{2}x)$," " $(2x)$," " $(x-y)$ " and " $(x+y)$."

As best seen in Figure 5, the lower disk 12 is provided with a tapered extension 19 which projects from a portion of its periphery to form a pointer and the upper surface of the disk 12 is 20 blocked off by means of two spaced concentric circles and a plurality of radially disposed lines extending between said circles to form thereon twenty-four closed spaces 20 each of which contains certain indicia 21. 25

The upper disk 13 is provided with a similar pointer 22 which is preferably distinctively marked to thereby distinguish the pointers 19 and 22. Disk 13 also includes an opening 23 30 shaped, sized and positioned to correspond with the spaces 20 so that by rotating the disk 13, relatively to the disk 12, opening 23 can be disposed over any one of the twenty-four spaces 20 to expose the indicia 21 contained therein. 35

As best seen in Figure 3, the back of the base member 11 is preferably provided with printed matter including the law of sines, the law of cosines, the law of tangents and a number of quantities, designated generally 24. 40

As heretofore stated, the indicator 10 is designed for use in giving identities to functions of angles in the study of trigonometry. The four parts of the set of indicia 15 constitute the four major functions and are spaced 90° apart, while 45 the six parts of the series of indicia 17 constitute the six minor functions which are spaced within the 90° space between two parts of the indicia 15. The letters "x" and "y" designate the word "angle." The base member 11, disk 12 and disk 50 13 are preferably formed of corresponding material and it may be stated that any suitable material may be used such as cardboard, paper, Celluloid, thin metal or any other suitable material on which the indicia heretofore described 55

may be inscribed, preferably a material that will be durable.

The operation of the indicator 10 is as follows: assuming that the operator desires to ascertain the cosine of twice an angle, the disk 12 is turned until its pointer 19 is centered over the calibration line 16 marked "cos," after which the disk 13 is turned to center the pointer 22 over the calibration line 18 designated "(2x)." The indicia 21 which is then exposed by the opening 23 will then read " $2 \cos^2 x - 1$." This indicia 21 is the function of the cosine of twice an angle. Obviously other functions of angles may be similarly found by similar manipulations of the indicator 10 in each instance by adjusting the disk 12 so that the pointer 19 is on the major function and the disk 13 so that its pointer 22 is on the minor function.

Various modifications and changes in the construction and arrangement of the parts forming the invention are contemplated and may obviously be resorted to as only a preferred embodiment thereof has been disclosed.

I claim as my invention:

1. A device of the class described comprising a base member, a pair of disks superimposed thereon, means for rotatably connecting said disks to said base, said base being provided with indicia on its upper side including four parts comprising the four major functions of an angle disposed in equally spaced apart relationship to each other on the exposed portion of said upper surface, and indicia arranged between two adjacent parts of the aforementioned indicia and including six parts comprising six minor functions of angles, said lower disk being provided with an arrowhead projecting from a portion of its periphery and forming a pointer to be positioned selectively on the parts of said first mentioned indicia, the upper surface of said lower disk being inscribed with indicia comprising a plurality of functions or identities of angles, and said upper disk being provided with an arrow-head projecting from its periphery and forming a pointer to be positioned selectively on the last mentioned indicia of said base, said last mentioned disk being provided with an elongated radially extending opening disposed in substantially diametrically opposed relationship to its pointer for reading the correct or necessary function or identity, forming a part of the indicia on said lower disk and exposed by the opening in the upper disk.

2. A trigonometric identifier comprising a base member, two disks pointed one on top of the other and on said base member, means for rotatably mounting the disks relatively to each other and to said base member, said disks each being provided with an arrowhead projecting from a portion of its periphery and forming a pointer, said base member being substantially larger than said disks, the upper surface of the exposed portion of said base member being provided with sets of indicia over which the pointers of the disks are selectively positioned for adjusting the disks relatively to each other for indicating the problem, the upper surface of the lower disk being provided with indicia comprising solutions to the problems, and said upper disk being provided with an elongated radially extending opening disposed in substantially diametrically opposed relationship to the pointer of the upper disk through which the correct solution can be read.

3. A trigonometric identifier comprising a base member, a pair of disks superposed on said base member, one above the other, means for rotatably connecting said disks to each other and to said base member, tapered extensions on portions of the peripheries of said disks forming pointers, said upper disk being provided with an elongated radially extending opening disposed substantially in diametrically opposed relationship to the pointer of the upper disk for exposing a portion of the lower disk, said base member being substantially larger than said disks and having a set of indicia on the exposed portion of its upper surface including four equally spaced parts for designating four different positions of the lower disk as indicated by its pointer, said base member also including a second set of indicia including six equally spaced parts for designating various positions of the upper disk as indicated by its pointer, the parts of the indicia of the second set being all disposed between two adjacent parts of the indicia of the first set, and the upper surface of the lower disk being provided with indicia of twenty-four correspondingly spaced parts, each associated with one of the twenty-four different positions in which the two disks may be positioned relatively to each other and constituting a solution of a problem as indicated by the positioning of the disks relatively to the indicia of the base member.

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