Nov. 9, 1943. A. L. THURSTON ET AL 2,334,135

CALCULATOR

Filed Dec. 10, 1941

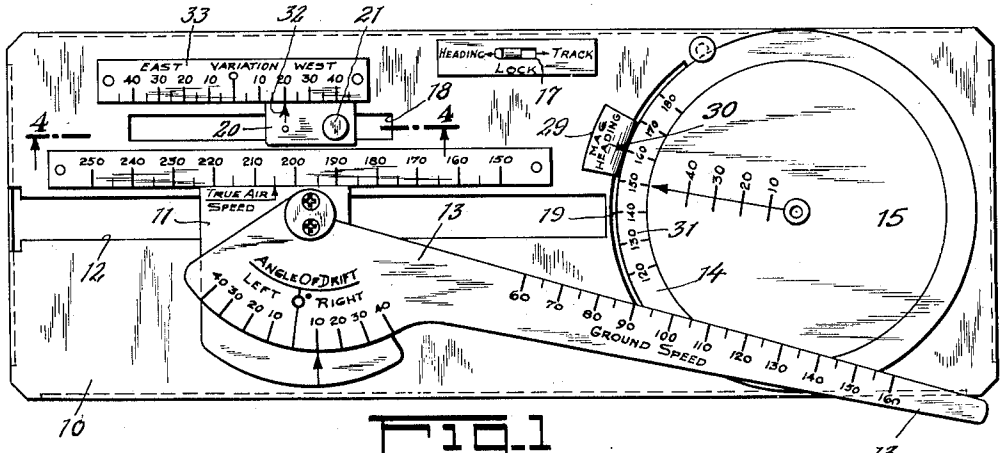


FIG. 1

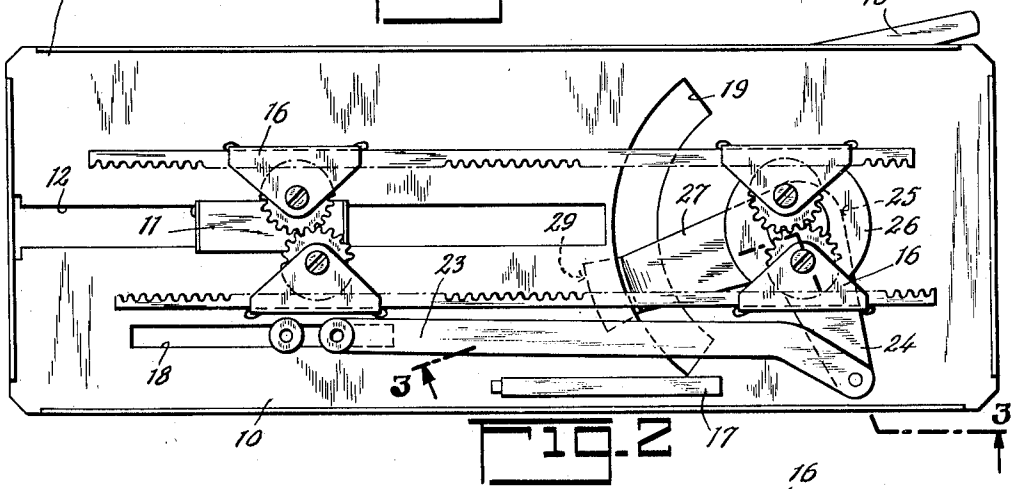


FIG. 2

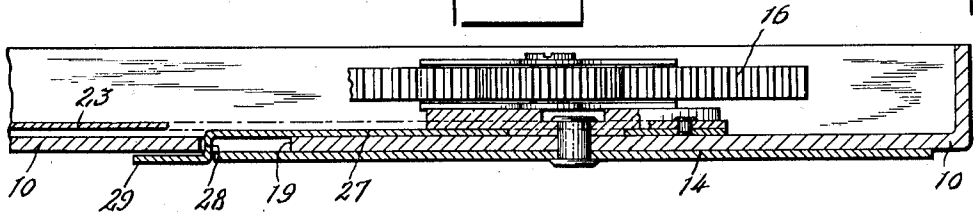


FIG. 3

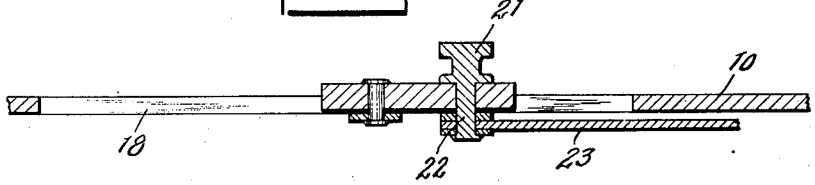


FIG. 4

INVENTORS
Arthur L. Thurston & Beauregard Sweeney
BY
W. E. Walk
ATTORNEY

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CALCULATOR

Arthur L. Thurston, Wantagh, and Beauregard Sweeney, Great Neck, N. Y., assignors to Cox & Stevens Aircraft Corporation, a corporation of New York

Application December 10, 1941, Serial No. 422,376

1 Claim. (Cl. 33—75)

Our invention relates to calculating devices for use in solving problems encountered in aerial navigation, and is a continuing development of that type or form of calculator disclosed in a certain co-pending application Serial No. 388,139, filed April 11, 1941, now Patent #2,296,692, Sept. 22, 1942, in the name of Arthur L. Thurston.

In aerial navigation, the magnetic compass is used almost exclusively as a means of determining direction and therefore, in the great majority of cases, it is the "magnetic heading" rather than the "true heading" that is either known or to be determined. With the calculator disclosed in said co-pending application, in order to take into account the magnetic variation, it is necessary either to set or to read the compass rose scale in conjunction with the proper division on the variation scale, rather than with the index arrow, or to convert the data and results of computations from "magnetic" to "true" by addition or subtraction of the variation angle. Either procedure is a potential source of error.

The object of the present invention is to provide an adjustable index which may be so set as to introduce automatically the required correction for a given magnetic variation when this index is used directly in cooperation with the scale on the compass rose.

With the above and other objects in view, the invention consists in the construction, combination and arrangement of parts hereinafter more fully described with reference to the accompanying drawing in which like characters denote like or corresponding parts in the several views.

In the drawing:

Fig. 1 is a top plan view of a calculator generally similar to that disclosed in said co-pending application, but with the improvements made the subject of the present invention added.

Fig. 2 is a bottom plan view of the calculator disclosed in Fig. 1, and

Figs. 3 and 4 are enlarged sectional views taken respectively on the dotted lines 3—3 and 4—4 of Fig. 1.

As stated above, the calculator as a whole is generally similar to that described and claimed in said co-pending application Serial No. 388,139. It includes a base member 10; a slide member 11 movable in a slot 12 in the base member and carrying a rotatable arm 13; a compass rose disc 14; and a true track index disc 15. The latter disc 15 and the arm 13 are connected by a mechanism 16 which imparts to the disc rotation in the same magnitude and sense as that imparted to the arm. A heading and track lock 17 selectively holds the compass rose disc 14 stationary on the base 1 or permits it (the compass rose) to move as a unit with the disc 15. The detail construction of these members 10 to 17, inclusive, and the various scales and indices inscribed thereon are similar to the corresponding details disclosed in said co-pending application, and the method of operation thereof is as therein set forth.

Instead of the true heading index and the magnetic variation scale shown in my earlier application, the improved calculator comprising the present invention includes an adjustable heading index, the details of which and the method of operation of which will now be disclosed.

Two slots 18 and 19 are provided in the base member 10. A slide member 20 is mounted with a running fit in the slot 18 (which is straight) for endwise movement along its length. A knob 21, by which the slide is moved, has a reduced portion 22 which extends through the slide and serves as a pivot for one end of a link 23. The other end of the link 23 is pivotally connected to one arm 24 of a bell-crank 25 rotatably carried by a member 26 whose axis of rotation is coincident with that of the rotatable discs 14 and 15.

The other arm 27 of the bell-crank 25 is offset as at 28 so as to extend from beneath the base member 10 up through the slot 19 (which is arcuate), with the extremity 29 of the arm 27 lying above the base member adjacent to the periphery of the compass rose disc 14. An index 30, labelled "Magnetic heading" is inscribed on the arm extremity 29 so as to read on the scale 31 of the compass rose disc 14.

Referring back to the slide member 20, it will be noted that said member has inscribed thereon an index 32, opposite which, on the base member 10, there is provided a scale 33 labelled "Variation." The graduations on this scale 33 extend in either direction from a zero mark which is so located on the scale that when the index 32 is moved opposite it the magnetic heading index 30 will lie on a line joining the centers of rotation of the arm 13 and the discs 14 and 15. Each graduation of scale 33 to the right (west variation) or left (east variation) of the zero mark is located so that when the index 32 is moved opposite it, the index 30 will be moved to a position above or below (respectively) the line joining the centers of rotation of the arm

13 and the discs 14 and 15 by the angle marked on the graduation.

Having described the construction of the calculator of the present invention it now remains to describe its method of operation. Briefly, the method is as follows: The slide member 20 is moved by means of the knob 21 until the index 32 thereon is opposite the mark on scale 33 corresponding to the known magnetic variation. The procedure thereafter is the same as that set forth in my co-pending application except that the magnetic heading on the compass rose scale 31 is set opposite the index 30—or if the desired magnetic heading is to be determined it is read on scale 33 opposite the index 32.

While we have described our invention in detail in its present preferred embodiment, it will be obvious to those skilled in the art, after understanding our invention, that various changes and modifications may be made therein without departing from the spirit or scope thereof. We aim in the appended claim to cover all such modifications and changes.

We claim as our invention:

In a calculator, a base member provided with a fixed magnetic variation scale and with a rotatable compass rose, a member carried by the base member and slidably adjustable with respect to it, said slide member being provided with an index adapted for cooperation with said scale, a rotatable member provided with an index adapted for cooperation with said compass rose, and a connection between said slide member and said rotatable member for automatically shifting the position of the rotatable-member-index accordingly as the position of the slide-member-index is shifted with respect to the magnetic variation scale.

ARTHUR L. THURSTON.
BEAUREGARD SWEENEY.