Feb. 18, 1941. E. E. GAY 2,232,319

STADIA PROTRACTOR

Filed Oct. 12, 1939

Fig. 1

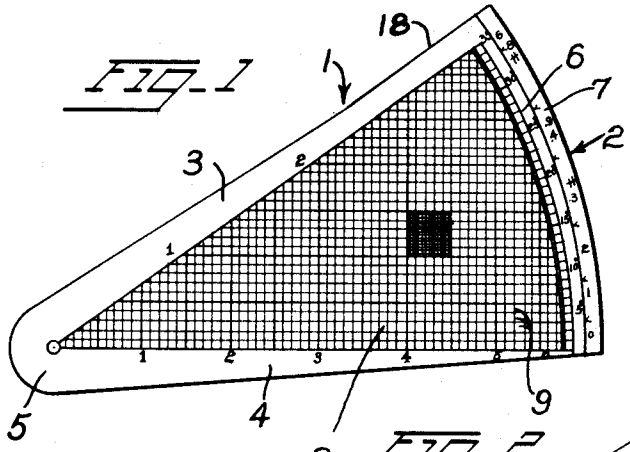


Fig. 2

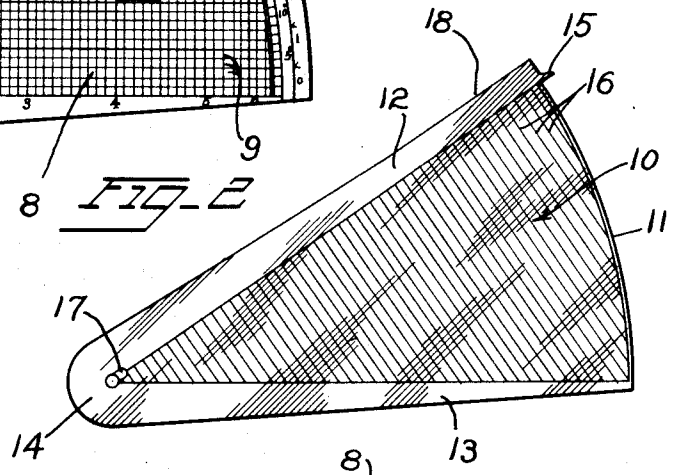
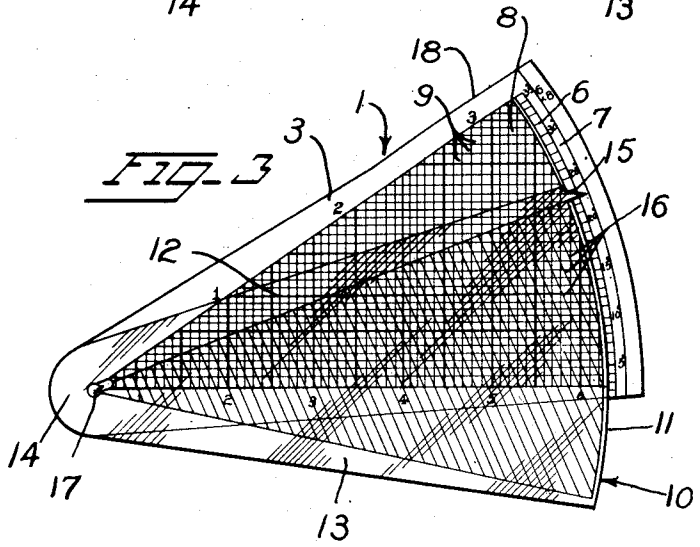


Fig. 3



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STADIA PROTRACTOR

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3 Claims. (Cl. 33—1)

This invention relates to an improved stadia protractor and seeks, among other objects, to provide a device of this character which will be effective for permitting the measuring of vertical and horizontal distances when the transit is not equipped with an attachment for permitting direct reading of such distances.

Another object of the invention is to provide a stadia protractor which will comprise a pair of swingingly engageable sector shaped plates on which are placed indicia for permitting the reading of vertical and horizontal distances.

A further object of the invention is to provide a stadia protractor which is characterized by the utmost simplicity and which will greatly minimize the amount of calculation required to obtain horizontal and vertical distances in a stadia survey.

Further objects of the invention will appear as the description proceeds.

In the drawing:

Figure 1 is a plan view of the graduated plate employed,

Figure 2 is a plan view of the slide plate, and

Figure 3 is a plan view showing the slide plate and graduated plate as they would appear in operative position.

Referring now to the drawing, the numeral 1 indicates in general the graduated plate. The graduated plate 1 is of sector shaped contour and is provided with an arcuate edge 2 and converging side edges 3 and 4 which meet at the apex 5. The side edges 3 and 4 are graduated from the apex toward the arcuate edge and said arcuate edge is provided with scales 6 and 7. The plate 1 is laid out throughout the major portion of its arc and between the edges 3 and 4 and the scale 6 with relatively large squares 8 which are subdivided into a group of smaller squares 9.

Mounted to slide over the face of the graduated plate 1 is a transparent slide plate 10 which is of substantially sector shape. The slide plate 10 has an arcuate edge 11 and side edges 12 and 13 which converge at the apex 14. The side edge 12 is projected past the arcuate edge 11 to define a pointer 15 which, as best seen in Figure 3, is adapted to cooperate with the scales 6 and 7. The slide plate 10 is provided, throughout the major portion of its area with parallel lines 16 which are perpendicular to the side edge 12.

In order to connect the plates 1 and 10, a bolt is employed. This bolt extends through the apices 5 and 14 at the meeting point of the inner edges of the side edges of both of the plates and through a slot 17. The slot 17 slidably mounts the slide plate with respect to the graduated plate. As will be seen in Figure 3, the slide plate 10 is of slightly less radius, or length, than the plate 1, so that the pointer 15 will be permitted to coperate with the scales 6 and 7.

The matter of laying off the plates 1 and 10 will now be set forth in more detail.

As will be seen in Figure 1 of the drawing, the arcuate edge 2 of the graduated plate 1 is provided with the scales 6 and 7, the scale 6 being laid off in degrees. The side edge 4 defines a base for the squares 8. As will be seen at 18, the upper edge of the side edges 3 and 12 are deflected near the arcuate edges 2 and 11, respectively, the purpose of which will be brought out hereinafter. On the scale, located on the base side 4 of the plate 1, two inches represent one hundred feet in the field on which the survey is being made, or one hundred one-hundredths of a foot, which is to say, one foot on the vertical rod which is normally held in front of the transit during the making of a survey. The two inch squares 8 are sub-divided into the squares 9 which have sides equivalent to ten feet in the field. The squares 9 should be further sub-divided to measure to one foot in the field. In order to facilitate reading, the hundred, ten and five foot lines are more heavily marked.

With further reference to the slide plate 10, the parallel lines 16 are not intended for measuring but to serve as transversals with reference to the graduation on the plate 1. They would probably be spaced at regular intervals ranging from three one-hundredths to one-tenth inch with every third one marked in heavier lines to facilitate reading.

The manner of using my improved stadia protractor will now be described. Let it be supposed that the stadia shot to be reduced is a rod reading of 510 with a vertical angle of either plus or minus of twenty-three degrees. The slide plate 10 is swung about the pivot bolt and in the slot 17 to the position where the pointer 15 overlies the twenty-three degree mark on the scale 6 of the plate 1. In this position, one of the parallel lines 16 will be in overlying relation to or near the 510 mark on the base or slope line of the plate 1. As previously explained, the slope line is defined by the upper edge of the side portion 4 of the plate 1. By moving the slide plate, of course, one of the parallel lines of the slide plate may be brought directly over the 510 mark, if it is not already in this position. If a straight edge or other object is held adjacent the edge 18, the slide can be moved without shifting the slide

from the twenty-three degree mark on which it is set. Attention is called to the fact that it is for this purpose that the edge 18 is provided. The parallel which is to overlie the 510 mark is a significant transversal for this particular measuring operation. Its intersection at the 510 mark in a slope intersection. The next step necessary is to follow the significant transversal to the intersection with the pointer line which is, of course, the critical intersection. At this point both the vertical and horizontal distances may be read. In the example given, estimating between lines, we read 442 for the horizontal distance and 153 for the vertical. In checking against stadia tables, it will be noted that the answers given are 432.1 and 183.45.

The slot 17 on the slide plate 16 will cover on the scale what corresponds to fifteen feet, approximately, in the field. Inasmuch as stadia is not used for measurements that are close to the instrument, this will be of no importance.

Where rod readings are greater than the scale range of the protractor, the manner of reading distances is as follows: For example, let it be supposed that the rod reading is 840, the angle x. With the protractor, the pointer is kept at angle x. Then obtain a horizontal and vertical distance for a 500 reading and add horizontal and vertical distances for a 340 reading. In order to correct for the discrepancy within the telescope, add horizontal and vertical reductions of the instrument constant. Horizontals are, of course, to be added to horizontals, and verticals are to be added to verticals.

It is believed that the operation and construction of my improved stadia protractor will now be understood.

Having thus described the invention, what is claimed as new is:

1. In a stadia protractor, a graduated plate of sector shape having graduated side edges and being laid off in squares, said graduated plate having an arcuate edge formed with scales, a slide plate having a pointer at one edge and having a plurality of parallel lines thereon, said lines being perpendicular to the pointer, and means pivotally connecting the slide plate with the graduated plate, the scales and squares on the graduated plate cooperating with the pointer and certain of the parallel lines for permitting reading of stadia distances from a rod reading and a vertical angle, said means permitting limited shifting movement of the slide plate on the graduated plate.

2. In a stadia protractor, a graduated plate of sector shape having side edges converging to an apex and having an arcuate edge provided with scales, one of the side edges defining a slope line, said graduated plate having its inner area laid out in squares, the slope line providing a base for certain of said squares, a slide plate of sector shape and of transparent material, said slide plate having an arcute edge and having side portions converging to an apex, one of said side portions being projected to define a pointer and having its edge near the arcuate edge deflected to lie parallel with the inner edge of the pointer, said slide plate having parallel lines throughout its inner area, said lines being disposed perpendicular to the pointer, and a bolt extending through the apices of the plates and pivotally connecting them for relative slidable movement, said pointer and parallel lines cooperating with the squares and scale for permitting reading of vertical and horizontal stadia distances from a given rod reading and angle of inclination.

3. In a stadia protractor as recited in claim 2, wherein the slide plate is provided with a slot for permitting longitudinal shifting movement of said slide plate relative to the graduated plate.

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