March 7, 1950 P. A. SUTO 2,499,935

INSTRUMENT FOR DRAWING ELLIPSES

Filed Dec. 4, 1945

Fig. 1.

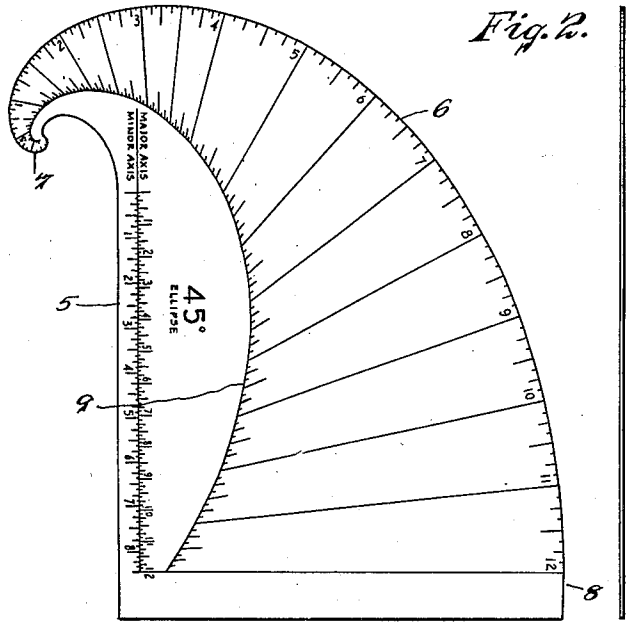
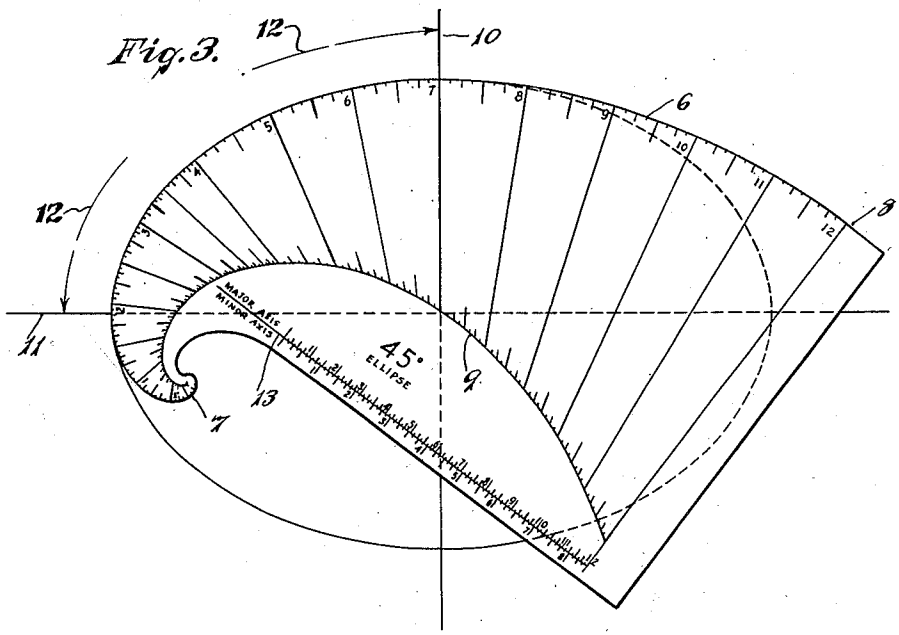


Fig. 2.

Fig. 3.



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Patented Mar. 7, 1950 2,499,935

UNITED STATES PATENT OFFICE

2,499,935

INSTRUMENT FOR DRAWING ELLIPSES

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Application December 4, 1945, Serial No. 632,652

7 Claims. (Cl. 33—1)

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This invention relates to instruments for drawing ellipses and more particularly to a drafting instrument which is adapted for use in accurately drawing ellipses of different sizes.

A primary object of this invention is to provide a simple and inexpensive instrument of sheet material having an edge that is curved so that different portions thereof may be used in drawing ellipses for different diameters; the said instrument being made in sets of different shapes, each to produce ellipses of different sizes for certain angles of vision.

Further objects and advantages of this invention will be more clearly understood from the following description and from the accompanying drawings, in which—

Figure 1 is a plan view of an ellipse drawing instrument comprising my invention.

Figure 2 is an edge view thereof.

Figure 3 is a view illustrating the manner in which the said instrument is used in drawing an ellipse.

As shown in the drawings, my improved instrument may be constructed of a sheet 5 of suitable material, preferably a transparent material such as Celluloid or other transparent plastic sheets now commonly used.

The said instrument is formed into a shape providing an edge 6 which is curved on gradually diminishing radii forming a spiral terminating at a point 7. The distance around said curved edge is graduated from zero to a desired number of units denoting inches of length of the major axis of ellipses for which the instrument may be used; the said graduations running along the margin of the edge 6 and each unit division thereof being sub-divided into fractions as may be desired. It will be noted that the graduations are numbered beginning at the point 7 and ending at the end 8 of said edge 6. A line 9 is provided opposite the said edge and graduated to conform with the graduations along the edge 6 for the purpose to be hereinafter described.

My improved instrument may be used for drawing ellipses of different sizes, as illustrated in Fig. 3 of the drawings. The axes of the ellipse are first drawn, as shown, these axes consisting of a minor axis line 10 and a major axis line 11. The major axis of the ellipse which is to be drawn is then chosen on the graduations along the edge 6. As an example, in the illustration shown an ellipse is being drawn for a seven inch major axis. Therefore, the instrument is placed with the indicia along the edge 6 denoting seven inches upon the line 10 and aligned so that said

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line will cross the corresponding graduation on the line 9 with the said line 9 directly upon the intersection of the axis lines 10 and 11. When the instrument is in this position, a quarter of an ellipse may be drawn by tracing around the quarter of the ellipse between the lines 10 and 11 and within the portion indicated by the arrows 12. The instrument is then turned to the opposite edge 6 of the ellipse, the said quarter is then drawn, and the instrument may be further turned for drawing the remaining quarters of the ellipse. After the four quarters have been drawn, the ellipse is complete and the major axis of the ellipse will be in conformity with the indicia which was selected from the graduation along the curve of the edge 6.

It will be noted that the particular instrument illustrated in the drawing hereof has indicia that is intended for a 45° ellipse. It is proposed that the said instrument will be furnished in sets so that ellipses for angles of sight may be drawn.

In order to indicate the corresponding dimensions of the maor and minor axes of an ellipse, for the different angles of sight, each of said instruments is provided thereon with a line 13 having corresponding scales juxtapositioned on opposite sides thereof in such a manner that any reading representing the length of the major axis falls opposite a reading representing the length of the minor axis of the same ellipse.

It will be noted that the corresponding graduations on the edge 6 and line 9 extend perpendicularly to the cooperative portions thereof so that, when the different quarters of an ellipse are drawn, in the manner illustrated in Fig. 3, the lines defining the said quarters will merge and coincide, within a practical approximation, on both the minor and major axes.

Edge 6 is an equi-angular spiral plotted on polar coordinates. Consequently, proceeding from the point of origin, each successive portion of the curve is similar in curvature to all preceding portions but on an increasing scale; thus, once a portion of a spiral has been found to approximate a quarter segment of a given ellipse, different portions of the same spiral will approximate to the same extent an infinite number of different sized ellipses of the same proportion as the first, within the arbitrary size limitations of a particular template. A series of templates of different curvatures are provided for drawing differently proportioned ellipses.

The locus of centers of all the ellipses that can be drawn with the same curve forms a similar

spiral, on line 9, having the same point of origin as the spiral of line 6.

Since the curvature of the spirals is mathematically constant, it is possible to apply a set of uniform graduations that tell the user precisely what portion of the curved edge to use for different sized ellipses, superimposing the proper graduations on any intermediate increments thereof upon the previously determined minor diameter of the required ellipse.

I claim:

1. An instrument for drawing ellipses comprising a sheet of transparent material having an edge in the form of a spiral, a line forming a spiral corresponding to the said edge, indicia running along the marginal portion of said edge and corresponding graduations along said edge and line providing a scale for indicating the position of said instrument for drawing ellipses of different sizes which are projections of different sized circles onto a single plane at an angle to the plane of the circles.

2. An instrument for drawing ellipses as set forth in claim 1 wherein the spiral line gradually converges towards the spiral edge to vary the position of the instrument for the drawing of ellipses of diminishing major and minor axis.

3. An instrument for drawing ellipses as set forth in claim 1 including a series of lines running perpendicularly to the spiral edge for indicating the required positioning of the instrument with relation to an axis of the ellipse.

4. An instrument for drawing ellipses comprising a member constructed of a sheet of transparent material and having an edge in the shape of a spiral or gradually diminishing radii; the marginal portion of said spiral edge having measuring indicia for indicating the position of said edge relatively to the axis of an ellipse for drawing ellipses of different sizes, which are projections of different sized circles onto a single plane at an angle to the plane of the circles, a series of lines running perpendicular to said edge for indicating the position of the instrument with relation to an axis of the ellipse to be drawn, and a spiral line running opposite to said curved edge and gradually converging towards said edge, the said line being graduated for indicating the required position of the instrument relatively to the intersection of the major and minor axis of the ellipse.

5. An instrument for drawing ellipses which are projections of different sized circles onto a single plane at an angle to the plane of the circles, the said instrument comprising a sheet of transparent material having a curved edge in the form of a spiral; a line forming a corresponding spiral and spaced from said edge and gradually converging in the direction thereof, and corresponding indicia on said line and along said edge for indicating the required position of said instrument relatively to an axis of an ellipse to be drawn therewith and to the intersection of major and minor axis of said ellipse.

6. An instrument for drawing ellipses which are projections of different sized circles onto a single plane at an angle to the plane of the circles, the said instrument comprising a flat member of transparent sheet material having an edge thereof curved in the form of a spiral and to provide the curvature for quarters of ellipses of the same proportions of major to minor diameters, graduations running along the marginal portion of said curved edge, a line in the form of a spiral spaced from said edge and gradually converging therewith, and a series of corresponding graduations on said line and said edge providing means for positioning corresponded portions of said edge perpendicular to the minor and major axis lines drawn along said edge and defining separate quarters of the ellipse.

7. An instrument for drawing commercially practicable approximations of ellipses, said instrument comprising a member of transparent sheet material having as an edge thereof a first equi-angular spiral, graduations running along the marginal portion of said spiral edge to be placed at the extremities of the minor diameter of the required ellipse; a second equi-angular spiral having the same point of origin as the first spiral, and graduations on said line corresponding to graduations on the said edge to be placed on the intersection of the major and minor axes of the required ellipse for defining four symmetrical ninety degree segments of a series of ellipses of different sizes but of the same proportion of major to minor diameters.

PAUL A. SUTO.

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