No. 754,513. PATENTED MAR. 15, 1904.

H. A. SWENSON.

DRAFTING IMPLEMENT.

APPLICATION FILED FEB. 13, 1903.

NO MODEL.

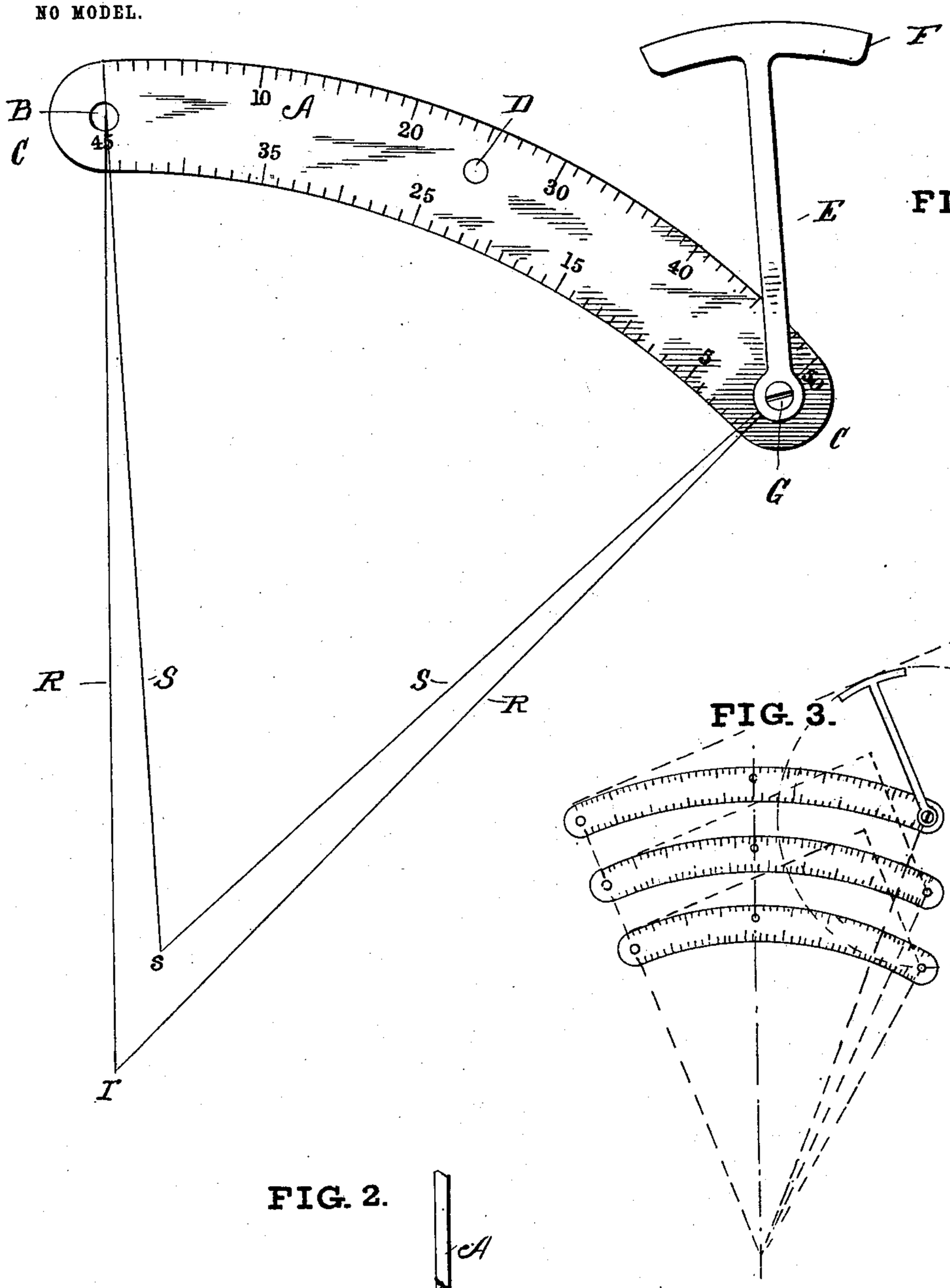
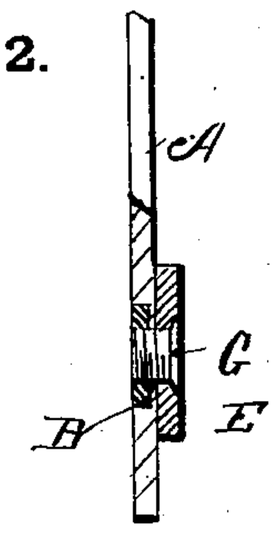


FIG. 1.

FIG. 3.

FIG. 2.



Witnesses
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No. 754,513. Patented March 15, 1904.

UNITED STATES PATENT OFFICE.

HENRY A. SWENSON, OF ST. PAUL, MINNESOTA.

DRAFTING IMPLEMENT.

SPECIFICATION forming part of Letters Patent No. 754,513, dated March 15, 1904.

Application filed February 13, 1903. Serial No. 143,237. (No model.)

To all whom it may concern:

Be it known that I, HENRY A. SWENSON, a citizen of the United States, residing at St. Paul, in the county of Ramsey and State of Minnesota, have invented certain new and useful Improvements in Drafting Implements, of which the following is a specification,

This invention relates to implements for draftmen's use.

The object of the invention is to construct and adapt to a "curve" or set of curves a tangent-gage which may be quickly applied or adjusted to the drawing calculating or outlining of curves and tangents.

The invention consists in a curve (curved rule) or set of curves and tangent-gage applicable thereto and in details for carrying out the invention.

Figure 1 is a plan of a curve with tangent-gage applied. Fig. 2 is a sectional edge view enlarged. Fig. 3 is a diagram illustrating three curves of a set and tangent-gage as applied to such curves.

The drawing-curve A may be of any usual material, such as wood, metal, hard rubber, cardboard, or other material. The edges of this curve are formed to be true arcs of circles, and the curvature is as desirable, there being generally with each set of drafting implements a number of curves or curve-rulers. As usually constructed the outer and inner circles on which a particular curve rule is struck are alike or of equal diameter, and as their radii are necessarily alike the arcs of the two curves are not identical in length, the arc of the outer curve being greater than that of the inner curve and the edges being eccentric. This eccentricity depends on the lengths of the arcs and the width of the ruler. Such a curved ruler or curve A, I perforate, as at B, near each end, and the end is rounded, as at C, on an arc, of which the center of hole B is the center. The curve is also centrally perforated, as at D, so that lines may be observed through the opening B, which is not occupied by the tangent-gage, and through opening D.

A tangent-gage E is formed of suitable material—say such as has been specified for the body of the curve. This tangent-gage has its outer edge F formed on the arc of a circle and its inner end is pivoted to the curve A at one or the other ends by a pivot connecting the stem of said tangent-gage to one of the openings B in said curve. The pivot connecting the gage to the curve may be a screw G or other device by which the two parts can be held together—as, for instance, the thumb of the operator—and preferably so that the gage is readily removable, so as to be placed at either end of the curve to lay off either right-hand or left-hand tangents, or the gage may be readily attached to any curve of a set. In laying off tangents the edge F is swung to the outer or to the inner edge of the curve, according as the tangential line is to be located. In drawing tangent lines a rule is laid against the edge of the curve and against the edge F of the gage. As the edge F is the arc of a circle, it requires little skill to adjust the ruler thereto. Again, any straight line being considered the tangent, the gage and curve may be applied thereto to strike a curve line from this tangent and the curve selected will determine the deviation.

Curve rules or "curves" are usually made in sets on curves of specified radius. My set of curves are preferably of such length or arcs that the same tangent-gage can be applied to any one of the curves of the set and being turned to position exterior to the curve the line tangent to the outer curve of the gage will be tangent to the curve. Thus the curves will be longer in degrees, although shorter in absolute length, as they decrease in radius. The same result could be reached by making a special gage for each curve of a set; but as this would needlessly multiply instruments I prefer that the set of curves should be of such length in degrees or degrees and fractions as will permit the same gage to be applied to several or all the curves of a set.

As indicated in dotted lines *e*, the tangent-gage is at its outer end the arc of a circle surrounding the opening or pivot G in the curve. The gage might be a disk or full circle, as shown by dotted lines, but such a device would be less convenient than is a radius-bar E with an arc or sector as the gaging-surface F. The gage should be thin, so as to lie close to the surface on which it is to be used,

and the pivot should be short, so as not to interfere with the pen or pencil of the draftsman. The rule or straight-edge lies against the arc F and the curve in drawing a tangent from the curve, and the draftsman will readily see when arc F is turned to proper position.

The curve A has preferably an index-gage of degrees on both its outer and inner edges. As the edges are on the arcs of equal radii, these arcs are necessarily eccentric and the curve is wider at the middle than at the ends. I therefore index the outer and inner edges of the curve in opposite directions, thus producing a tool very convenient for use.

In Fig. 1 the radius-lines R R of the inner arc of curve A have their center at *r*, and the radius-lines S S of the outer arc have their centers at *s*. The outer arc is of course longer than the inner arc.

It may happen that some of the curves of a set may not be divisible for their length into an exact number of degrees, but this is not material, as the beginning of each index can always be at unity.

The curved ends of the curves are a protection to the index. The large perforations B are convenient for hanging up the curves when not in use.

What I claim is—

1. The combination with a draftsman's curve, of a tangent-gage pivoted to said "curve," as set forth.

2. The combination with a draftsman's curve, of a tangent-gage connected to the curve and having its exterior surface in form of an arc.

3. The combination with a set of curves of different radii and length as described, of a tangent-gage, and means for attaching it to any curve of the set.

4. A draftsman's curve having both its ends perforated, combined with a tangent-gage removably attachable to either of the perforated ends of the curve.

5. A draftsman's curve having outer and inner arcs of like radii, and indexed to read in opposite directions on the two edges, combined with a tangent-gage removably attachable to either end of the curve.

In testimony whereof I affix my signature in presence of two witnesses.

HENRY A. SWENSON.

Witnesses:
JOHN TOWNSEND,
GEO. S. RUMBOLD.