

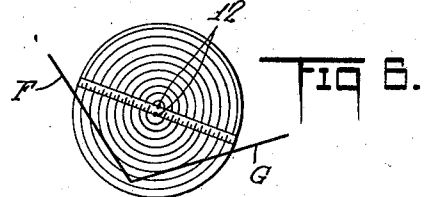
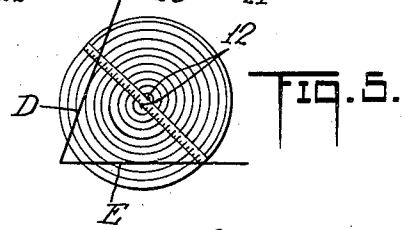
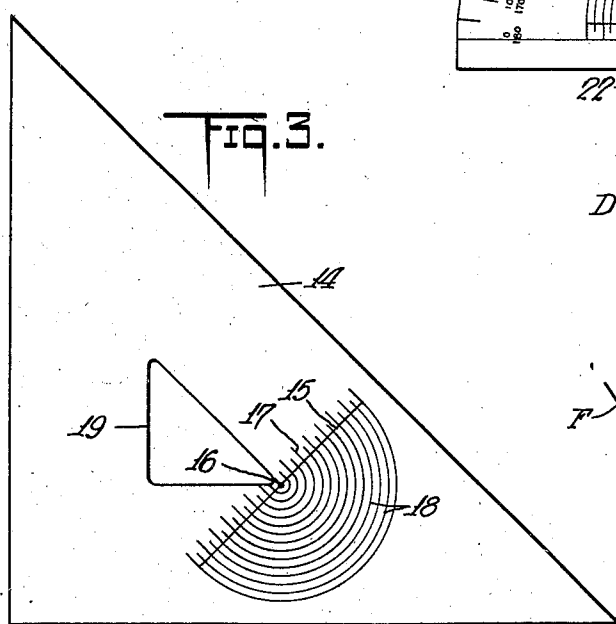
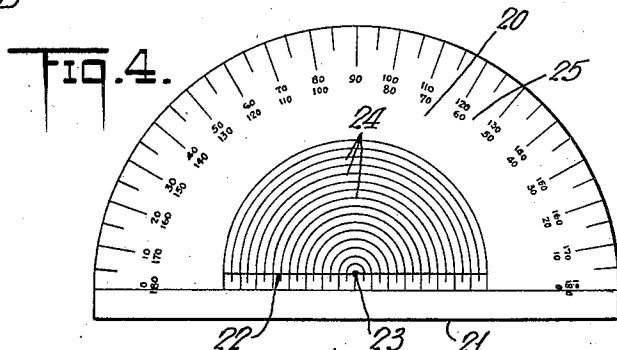
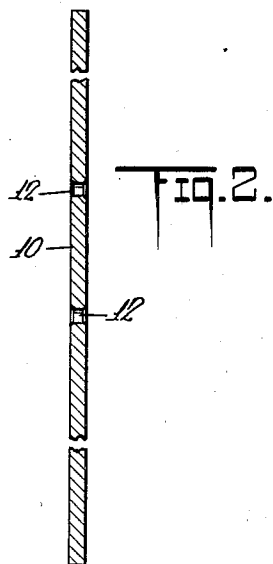
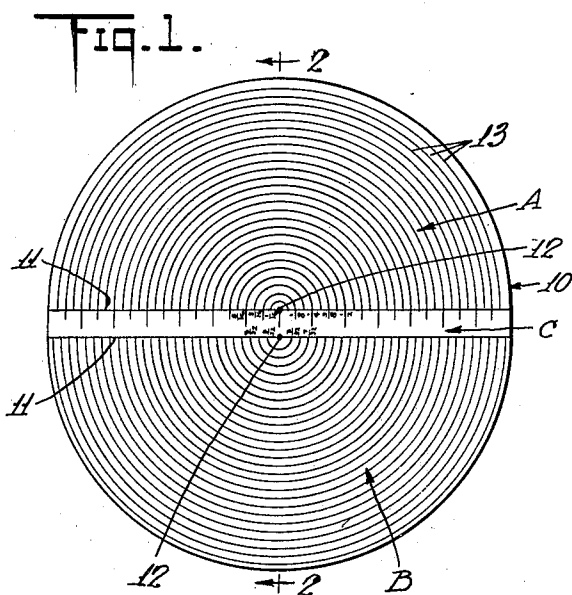
Sept. 10, 1935.

K. SIMON

2,014,190

DRAFTING IMPLEMENT

Filed Oct. 1, 1931



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# UNITED STATES PATENT OFFICE

2,014,190

## DRAFTING IMPLEMENT

Karl Simon, Newark, N. J.

Application October 1, 1931, Serial No. 566,189

4 Claims. (Cl. 33—1)

My present invention is concerned with a draftsman's implement which may have a wide range of utility in laying out, tracing and reading drawings, but which is peculiarly suited for use in establishing the center of circular arcs connecting two converging lines and in establishing such center in proper relation to the converging lines.

In laying out drawings where two converging lines are to be connected by the arc of a circle, present drafting methods involve a considerable expenditure of time to find the proper center of the arc, even where the radius of the arc is known. When the radius of the arc is optional with the draftsman, the same difficulty is encountered. Also when tracing or copying drawings, the centers of some of the arcs may have become obscured and it is a difficult and tedious job to find them.

An object of the present invention is to avoid the above noted difficulties by the provision of a simple, inexpensive drafting tool with which a draftsman may instantaneously find the center of the desired arc regardless of whether the radius of the arc is known or optional with the draftsman.

Another object of the invention is to provide an implement of this character devoid of any moving parts which require adjustment, devoid of any need for making mathematical calculations and operative by simply placing it upon the sheet of drawing and shifting it into correct position. Such position may be readily determined by casual observation of the lines on the implement.

Another object of the invention is to provide an implement of this character of extremely simple, inexpensive nature which will be rugged and durable in use, which is characterized by substantial rigidity in construction and is well suited to meet the requirements of economical manufacture.

Another object is to provide a combination draftsman's tool in which the present implement is combined with standard implements, such for instance, as triangles or protractors without in any way detracting from the normal construction or normal operation of the standard implements and by the simple expedient of making one or more perforations in the standard implements and providing them with the desired ruling and/or calibrations.

Still another object is to provide an implement of this character requiring no skill in its manipulation and use and which will enable even a tyro to correctly determine the center of the circular arcs which are to be drawn.

In accordance with a preferred embodiment of

the invention, the implement consists of a rigid plate of transparent material having an opening therethrough of sufficient size to conveniently receive a pencil point or other marker. The perforation is preferably at the center of a graduated scale line and the center of a plurality of concentric semi-circular arcuate lines, the ends of which terminate at the scale line. The scale line is marked in terms of the radii of the arcs which intersect it.

When using the implement, it is merely necessary to place the transparent plate upon a sheet of drawing paper bearing the two converging lines to be joined by a circular arc. Where the radius of the arc is known, the implement is shifted until the semi-circular line corresponding to that of the radius is tangential to the converging lines to be connected, whereupon the center of the arc is definitely established by the perforation of the implement and may be marked by inserting a pencil or pricking implement therethrough.

Where fillets or the like are to be laid out, and the diameter of the arcuate curves of the fillets is optional with the draftsman, the implement is laid upon the sheet of drawing and the draftsman may shift any of the semi-circular arcs into tangential relationship with the converging lines, judging by eye the shape of the fillet and noting the radius of the particular line which he has selected. The centers of the arcs of the other fillets may be correspondingly conveniently located.

The nature of the implement is such that it may be conveniently embodied in any available space in a triangle, protractor or similar implement, it merely being necessary to perforate the triangle or protractor and mark the necessary scale lines and arcs thereon.

For convenience in obtaining a maximum number of definite radii in a single implement, I may provide a pair of parallel scale lines and a pair of oppositely extending sets of concentric semi-circular arcs, the graduations of one scale line and the corresponding arc radii being staggered with respect to the graduations and arc radii of the other. Typically, one set may start at  $\frac{1}{8}$ " and be spaced  $\frac{1}{8}$ " apart while the other set may be set at  $\frac{1}{2}$ " and be spaced  $\frac{1}{8}$ " apart. Thus there will be an arc provided for every  $\frac{1}{2}$  of an inch and yet the actual space between arcs will be  $\frac{1}{8}$  of an inch, whereby to promote facility of reading the implement.

The invention may be more fully understood from the following description taken in connection with the accompanying drawing, wherein:

Fig. 1 is a plan view of an instrument embodying my invention;

Fig. 2 is a broken vertical sectional view on the line 2—2 of Fig. 1;

Fig. 3 is a plan view of a triangle embodying the invention;

Fig. 4 is a plan view of a protractor embodying the invention;

Figs. 5 and 6 are diagrammatic views illustrating respectively the method by which my instrument may be used in determining the centers of arcs connecting respectively lines forming an acute and an obtuse angle.

Referring first to Figs. 1 and 2 of the drawing, I have used the reference numeral 10 to designate a plate of transparent material such for instance as the tough slightly flexible sheet material commonly used in the manufacture of triangles, French curves, protractors etc. The plate may assume many shapes but is here illustrated as of nearly circular shape in that it comprises a pair of semi-circular sections A and B integral with an intermediate narrow scale bearing portion C. The edges of the scale bearing portion C are defined by parallel scale lines 11. At the center of each of these scale lines, the plate is perforated as at 12 providing a narrow tapered orifice through which the point of a pencil or of a pricking instrument may be inserted. The slight taper of the orifices 12 aids in guiding the lead of a pencil or a similar instrument through the plate and into contact with the sheet of drawing paper below it.

The scale lines 11 are graduated from the center outwardly in both directions, the center mark of each scale being designated at zero, and the scale being graduated in terms of inches or centimeters as desired.

A plurality of concentric semi-circular arcuate lines 13 are drawn on each of the semi-circular sections A and B, the radii of these arcs being indicated on the associated scale lines at which the ends of the arcs terminate.

With the form of invention shown in Fig. 1, the arcs on the section A start at a  $\frac{1}{8}$ " arc and the radius of each successive arc is increased  $\frac{1}{8}$  of an inch. The smallest arc on section B however, is  $\frac{3}{8}$  of an inch and the arcs on this section of the instrument are also of progressively increasing radii and are spaced  $\frac{1}{8}$  of an inch apart.

Obviously all of the arcs could be marked upon a single semi-circular section of material but to do so, the arcs would be spaced only  $\frac{1}{8}$  of an inch apart and the lines would be so close together that they would be confusing to read on the scale. By using the two semi-circular sections and staggering the semi-circular arcs thereon, all of the desired range from  $\frac{1}{8}$  of an inch up and increasing at the rate of  $\frac{1}{8}$  of an inch are made available while the individual arcs are spaced apart  $\frac{1}{8}$  of an inch to avoid eye strain.

Typical uses for the instrument are shown in Figs. 5 and 6. In Fig. 5, it is desired to determine the center of an arc connecting the two acutely converging lines D and E where the radius of the circle is known. In order to determine the center, the instrument is placed over the paper upon which the lines E and D are drawn and shifted until the arc corresponding to the known radius is disposed tangentially to the lines D and E. The center of this arc is automatically determined by the perforation 12 and a pencil mark is made upon the paper indicating the desired center and facilitating the drawing in of the arc.

In Fig. 6, substantially the same problem is present in determining the center of an arc for connecting the two obtusely converging lines F and G. Here the instrument is again laid on the paper and moved into position until the particular arc thereon having the known radius is tangential to the lines F and G whereupon the paper is marked by inserting an implement through the perforation 12.

In many cases, the radius of the arc for connecting the converging lines is optional with the draftsman and in this instance, it will be apparent that the draftsman by shifting the instrument back and forth over the paper, may readily observe the appearance of a fillet struck from any desired radius and when he has by visual observation, determined the most appropriate size of fillet or connecting arc, this center may be quickly marked in the manner described above.

In Fig. 3, I have illustrated an ordinary right angle triangle 14 which is made of transparent material and have shown the manner in which the triangle has been treated to embody my improved drafting implement as an integral part thereof. Here a scale line 15 corresponding to the scale lines 11, is drawn at right angles to the hypotenusal edge of the triangle and at the center of the scale, there is provided a tapered pencil opening 16. The scale is graduated in opposite directions from the pencil opening, as indicated at 17, and the concentric arcs 18 are drawn in such a manner that they do not interfere with the usual central triangular opening 19 of the implement 14.

In Fig. 4, I have illustrated a conventional type of protractor 20 which is provided at a point spaced from its straight lower edge 21 with a scale line 22. At the center of the scale line, a pencil receiving perforation 23 is provided and the progressively increasing series of semi-circular arcs 24 are drawn about the perforation 23 as a center. These arcs lie within the confines of the usual semi-circular graduations 25 of the protractor. Obviously the suitably marked triangle or protractor may be used in the manner illustrated in Figs. 5 and 6 for determining the centers of arcs or for visually indicating the appearance of arcs of various sizes when used to connect a pair of converging lines. It will be seen that the implement which is of extremely simple construction may be used to very rapidly determine the unknown center which could otherwise be worked out only after time consuming calculations.

If instead of ruling the arcuate lines on the implement, the implement were provided with corresponding arcuate slots, finding of the desired center and drawing of the desired arc might be accomplished simultaneously. For practical purposes, however, the use of slots is highly undesirable not only because they are conducive to great inaccuracy in drawing of the desired lines but because they so weaken the implement that it is readily broken, particularly if the slots are arranged sufficiently close together to be of any practical value.

It will thus be seen that there is herein described apparatus in which the several features of this invention are embodied, and which apparatus in its action attains the various objects of the invention and is well suited to meet the requirements of practical use.

As many changes could be made in the above construction, and many apparently widely dif-

ferent embodiments of this invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:—

10 1. An implement of the class described including a flat transparent body portion having a pair of straight parallel scale lines thereon and having apertures to receive marking implements at the centers of the respective scale lines, a plu- 15  
rality of semi-circular lines associated with each scale line and extending in opposite directions from the respective scale lines.

20 2. An implement of the class described including a flat transparent body portion having a pair of straight parallel scale lines thereon and having apertures to receive marking implements and disposed at the centers of the respective scale lines, a plurality of semi-circular lines associated with each scale line and extending in opposite 25  
directions from the respective scale lines, said semi-circular arcs being concentric with the respective apertures and the radii of said arcs being readable on the respective scale lines.

30 3. An implement of the class described including a flat transparent body portion having a pair

of straight parallel scale lines thereon and having apertures to receive marking implements and disposed at the centers of the respective scale lines, a plurality of semi-circular lines associated with each scale line and extending in opposite directions from the respective scale lines, said semi-circular arcs being concentric with the respective apertures and the radii of said arcs being readable on the respective scale lines, both sets of arcuate lines including arcs spaced equidistantly apart and the arcs of one set being of different radii than the arcs of the other set.

4. A drafting implement of the class described, including a flat, transparent body having two apertures therein, each adapted to receive a marking implement, said body bearing parallel scale lines, each intersecting one of the apertures, the line through said apertures being substantially perpendicular to the scale lines, and said body having marked on one surface thereof two sets of semi-circular arcuate lines, each set being concentrically arranged and drawn about one of the apertures as a center and intersecting said scale lines, said body also having indicia adjacent to said scale lines for indicating the radii of the arcuate lines, the spacing of one set of arcuate lines being different from the spacing of the other set.

KARL SIMON. 30