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DRAWING INSTRUMENT

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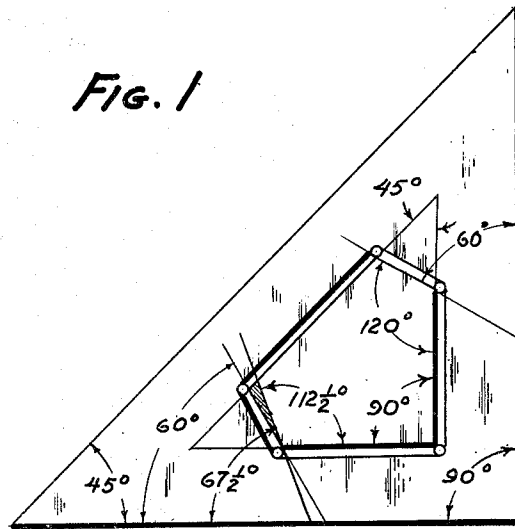


Fig. 2

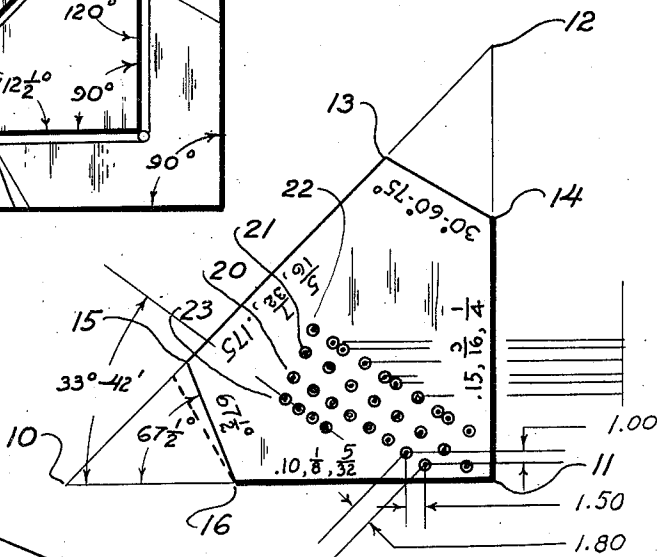


Fig. 4

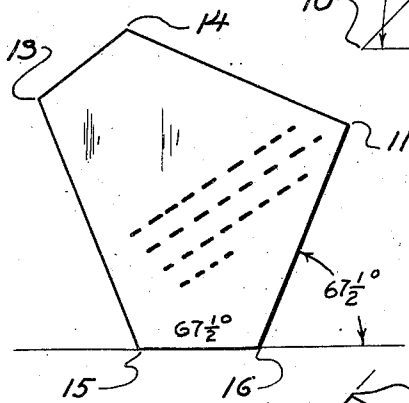


Fig. 5

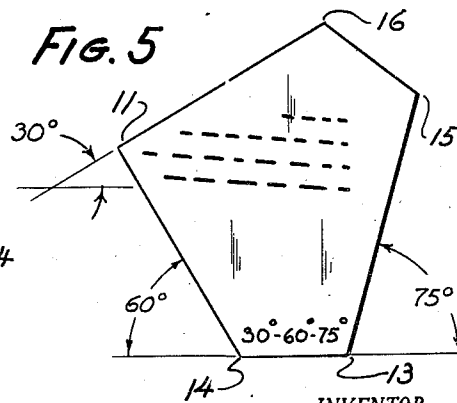
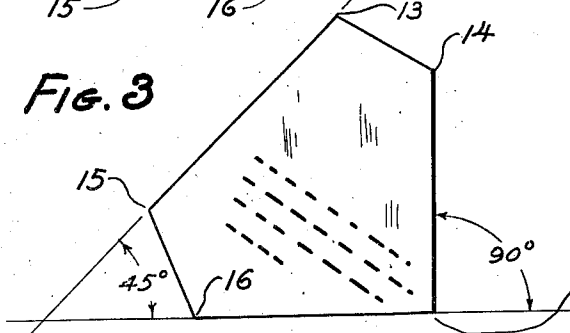


Fig. 3



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DRAWING INSTRUMENT

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Continuation of application Serial No. 117,815, September 26, 1949. This application November 24, 1953, Serial No. 394,137

3 Claims. (Cl. 33—104)

This invention relates to geometric instruments and more particularly to an improved instrument for drawing parallel lines, such as guide lines used on drawings as an aid for lettering notes thereon. The present application is a continuation-in-part of my abandoned application Serial No. 665,186 filed on April 26, 1946, and a continuation of my abandoned application Serial No. 117,815, filed September 26, 1949 for a Drawing Instrument.

One of the objects of the present invention is to provide an improved instrument for drawing guide lines, of the perforated template type.

Another object of the present invention is to provide an improved instrument of the foregoing character, which is small, light and compact and can be easily shifted along a guiding or straight edge on the point of a pencil, and which can be brought very close to the edge of a small drawing board, such as are used in schools, without tipping over such edge when drawing of guide lines near the edge of a drawing is attempted.

A further object of the present invention is to provide an improved instrument for drawing guide lines, which instrument, while being small and compact, enables the user to draw guide lines or similar lines at a large number of pitches, i. e. distances between the individual lines both uniformly spaced as well as those spaces at certain periodically recurring distances.

A still further object of the invention is to provide an improved instrument for drawing guide lines which instrument while being smaller and more compact than conventional instruments of this general nature enables the user to draw guide lines to meet the requirements or lettering standards of both decimal and fractional types.

A still further object of the present invention is to provide an improved instrument for drawing guide lines which instrument while providing a full range of practically required guide line pitches or distances within a very limited space of the instrument, attains said result in a single-piece construction of the instrument and particularly without providing various adjustments or rotating pieces which due to the shrinkage of the plastic materials usually employed for making such instruments may become loose in their frames making the instrument very difficult to use or even rendering it totally unusable.

A still further object of the present invention is to provide an instrument for drawing guide lines, which instrument in addition to its guide line drawing function also is a useful drawing template for detail work and enables drawing lines at a large number of angles to any given line, thereby eliminating in many instances the necessity to use a number of small triangles and a compass and constantly shifting from one such instrument to another.

A still further object of the present invention is to provide an instrument of the foregoing character, the template of which is of such a construction as to be produced in a virtually completed form in the process of making a drafting triangle and from a piece of material

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which in conventional manufacturing practice goes to waste.

A still further object of the present invention is to provide an improved instrument of the foregoing character which is simple in construction, convenient to use, and inexpensive to manufacture.

Further objects and advantages of the invention will be apparent from the following description, taken in connection with the appended drawing, in which:

Fig. 1 is a view illustrating the method of making a template for the instrument embodying the present invention, in the process of making a drafting triangle.

Fig. 2 shows a completed instrument embodying the present invention.

Figs. 3, 4 and 5 illustrate positions of the instruments for obtaining various angles useful both in lettering as well as in general drafting work. It will be noted that in these figures the rows of pencil holes are indicated for the sake of simplicity by broken lines.

It is to be understood that the invention is not limited in its application to the details of construction and arrangement of parts illustrated in the accompanying drawing, since the invention is capable of other embodiments and of being practiced or carried out in various ways. Also it is to be understood that the phraseology or terminology employed herein is for the purpose of description and not of limitation.

In the drawing there is shown by way of example an instrument for drawing parallel lines or guide lines for lettering, embodying the present invention. As will be explained in detail below, the instrument is not limited to the above use, and can be also used as a template for general drafting.

Referring to Fig. 2, the instrument comprises a template made preferably of a transparent plastic sheet material such as cellulose nitrate or acrylic resin, approximately .060" thick. The template is of an irregular pentagon shape and comprises the elements of a right isosceles triangle; i. e., if three of its sides are extended until they intersect each other at points 10 and 12, a right isosceles triangle 10—11—12 is formed, as shown in Fig. 2. I prefer to make the template of such a size that such a triangle has its perpendicular sides equal to approximately 3½ inches or slightly larger. A template of such a size while being small and light, nevertheless permits convenient arrangement thereon of pencil point receiving holes in a sufficient number and in a proper disposition. The corners of the would-be triangular template are cut off along the lines 13—14 and 15—16 to form a template of a pentagon shape, as mentioned.

The side 13—14 forms with the side 14—11 an included angle of 120° while the sides 15—16 and 16—11 form an angle of 112½°, as illustrated in Fig. 1. The sides 16—11 and 11—14 form a 90° angle.

By virtue of such a construction the template of the instrument presents by itself and apart from its guide lines drawing features an extremely useful drafting template for general drafting, particularly in instances where small 90°—45° and 30°—60° triangles are usually used. When the template is placed with its side 16—11 against a straight edge or a given line as shown in Fig. 3, its side 11—14 enables drawing perpendiculars to such a line, while the side 15—13 enables drawing lines at 45° thereto. Placing the template on its side 15—16 as shown in Fig. 4, enables drawing lines at 67½°, which lines are used extensively in schools to indicate the slope of inclined lettering characters. In such a position, the side 11—14 is disposed at 22½° angle to the base line and may be used for drawing lines at such an angle thereto. In the position of the template illustrated in Fig. 5, its sides enable drawing lines at 60°, 30° and 75° to the base line, respectively. It will be understood that in each of

the above positions, lines at the same angles but oppositely directed may be obtained when the template is turned over but placed the same side or edge. For instance, by turning the template over from the position of Fig. 3 and placing it on the same side 11—16, the 45° lines sloping down to the right (instead of to the left as in Fig. 3) may be drawn.

It can now be seen in view of the foregoing that the short sides 15—16 and 13—14 should be of sufficient length to provide a proper bearing on the straight edge. I prefer to make them approximately one half of the length of the perpendicular sides. Such an effect can be attained by cutting off (in layout) the corners of the triangle 10—11—12 at distances equal to approximately one third of the length of the perpendicular sides.

In accordance with the invention there are provided on the template a plurality of pencil point receiving holes. I provide said holes in rows having such respective inclinations to the sides of the template that the lines drawn through any two holes of a row parallel to the three long sides of the templates are disposed at three different distances. With the four rows of holes spaced differently within the respective rows, and with each row giving three different spacings depending upon which of the three long sides the template is placed for drawing the parallel or guide lines, I can thus obtain 12 different spacings. By a proper selection of the spacings of the holes within the rows, the spacings obtainable in use of the instrument may be made to cover the entire range of spacings required in drafting work.

In the preferred embodiment herein illustrated by way of example, three full rows of holes, 20, 21, and 22, and a short row 23 are provided. The rows are parallel to one another and are provided at an angle of approximately 33½° (33°—26') to the side 16—11 sloping toward the 90° angle of the template. By virtue of such a construction any two holes in a row enable drawing parallel lines spaced at distances from each other in the relation of 1:1.5:1.8, depending upon which of its three longer sides the template is placed against the straight edge. By spacing the holes at such distances that when the template is placed on its side 16—11, the row 20 gives lines spaced at .10", the row 21 gives lines spaced at ⅙", and the row 22 at ⅓₂" (with an intermediate hole at ⅞₄" for lower case letters), I obtain lines spaced at .15", ⅓₁₆" and ¼" (approximately) from the same rows 20, 21 and 22 when the template is placed on its side 11—14; and lines spaced at .180", ⅞₃₂" (approximately) when the template is placed for use at its side 13—15.

Such an arrangement and location of holes may be easily effected or laid out by a graphical construction, the centers of the holes being at points of intersection of desired number of lines spaced at distances relating as 1:1.5 and perpendicular to each other (see Fig. 2). The spacing of .180 is a resultant one, and its value is computed as of the hypotenuse of a right triangle having sides .10" and .15" in length.

The short row of holes designated by the numeral 23 has its holes spaced to produce lines at .075" distance for lettering in small letters, particularly in title blocks where the words "Drawn by:", "Checked by:" etc. are usually lettered in that size.

In accordance with the invention the spacing obtainable with the use of the instrument are marked adjacent the longer sides thereof in such a manner that when the instrument is placed for use with one of its longer sides against the straight edge, the spacings obtainable in such a position of the instrument appear in the upright position adjacent that particular side, and in the same arrangement as the rows of holes. Thus, when the instrument is placed with its side 16—11 against a straight edge, the markings .10, ⅙, ⅓₂ appear in the upright position, see Fig. 2, indicating that the rows 20, 21 and 22 enable drawing guide lines at such spacings, respectively. Similarly when the instrument is placed with its side 11—14

against the guiding edge, the markings .15, ⅓₁₆, ¼ indicate that the same three rows 20, 21 and 22 now enable drawing lines at such spacings. The same is true with respect to the side 13—15, having markings ⅓₁₆, ⅞₃₂ and .175. The row 23 need not be marked.

It will be noted that in some instances the marking is slightly different than the computed mathematical values therefor. This is due to the fact that it is preferable to adjust the computed value to the nearest ⅓₂ of an inch in fractional values, and to the nearest .025" in decimal values. For instance, the marking now appearing as ⅓₂ at the side 11—14 as computed would be ⅓₂×1.5 or ⅓₄, and marking now appearing as .175 would be a figure between .176 and .177. Such adjusted marking simplifies the use of the instrument and is permissible in view of the fact that such a slight error is inconsequential in this type of work.

An important advantage of the illustrated arrangement of pencil holes resides in the fact that it prevents the tendency of the pencil when using the uppermost holes to turn the template on one of its corners instead of sliding it.

The edges of the template at the pencil point receiving holes are chamfered as shown in order to ensure that a regularly sharpened pencil reaches the paper.

For use, the instrument is placed against a straight edge, such as that of a triangle or a T-square, and using one of its vertical sides as a guiding edge, the vertical marginal lines indicating the length of the note lines may first be drawn. Thereupon the instrument is placed against the straight edge to have the marking numeral indicating the desired line spacing (by the height of the letters) appear in its upright position. The pencil is then inserted into the upper hole of the corresponding row, and the instrument is moved along the straight edge to draw a line between the vertical marginal lines. The next line is drawn on the return stroke, using the next lower hole. If more lines are needed than there are holes in the row, the straight edge is moved down until the upper holes of the row is in registry with the last drawn line, whereupon the next lower hole is used to draw the next line.

It is an important advantage of the present invention that the template for my improved instrument comes out virtually completed as a result of one operation in the making of a right isosceles (45°—90°) drafting triangle, i. e., from a piece which in the conventional manufacture of the triangles goes to waste. Thus considerable saving both on the cost of material and labor is effected. As can be seen from an examination of Fig. 1, the inner opening of the 45°—90° triangle illustrated therein is cut on lines parallel to its sides to form the longer sides of the template, and on diverging lines forming 60° angles with the sides forming the right angle of triangle (or of the template). Thus the template is provided having two included angles of 120°, two included angles of 105°, and a 90° angle. For completing the template for use in my improved instrument herein disclosed it is necessary only to cut one of its shorter sides at 67½° to its adjacent side, i. e., to cut away the portion shaded in Fig. 1.

As is best shown in Figs. 4 and 5, the shorter sides of the template are marked to indicate the angular lines which can be drawn in the positions of the template placed on such sides.

It should be appreciated that the drafting triangle with a central opening as illustrated in Fig. 1 possesses a number of important advantages over a conventional triangle. Particularly, while giving the 90° and 45° lines similarly to a conventional triangle, my improved triangle also enables drawing short lines at 30° and 60° angles using the edges of its inner opening, thus decreasing the necessity of changing from 45°—90° to 30°—60° triangles. Moreover, my triangle can be used as a section-lining triangle as explained in detail in my said abandoned application. I prefer to make the same size central open-

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ing in several sizes of triangles, such as 6", 7", 8" and 10", thus ensuring sufficient supply of templates for the instrument disclosed herein. It should also be understood that no danger of over-supply of such templates is present, since such templates can be used without any modification as small drafting template, particularly for detailing work.

There is thus provided an improved drafting instrument and a method of making the same, whereby the objects of the invention listed above and numerous additional advantages are attained.

I claim:

1. A drafting template comprising a flat piece of transparent plastic material having the shape of a five-sided polygon, with its five included angles being equal to and arranged in the order of 90°, 120°, 105°, 112½°, 112½°, with the two sides forming between them the 90° angle and the side opposite to said 90° angle, if continued to their theoretical intersection, forming a right isosceles triangle with its equal sides having lengths of approximately two-thirds of said sides continued to their theoretical intersection; said template having provided thereon a plurality of parallel rows of pencil point receiving holes commencing immediately adjacent the vertex of the 90° angle and extending at an angle of approximately 33½° to one of the equal sides toward the hypotenuse of the theoretical triangle and terminating before reaching the distance at which the pencil inserted into the last hole of any row would tend to turn the template around its corners.

2. A drafting template comprising a flat piece of transparent plastic material having the shape of a five sided polygon, with its five included angles being equal to and arranged in the order of 90°, 120°, 105°, 112½°, 112½°; with the two sides forming between them the 90 angle, and the side opposite to said 90° angle, if continued to their theoretical intersection, forming a right isosceles triangle with its equal sides having lengths of approximately three and a half inches, with the lengths of said actual equal sides being approximately two thirds of said sides continued to their theoretical intersection,

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said template being provided with at least three rows of pencil point receiving holes having not less than eight holes in each row, said rows being arranged parallel to one another and extending generally from the 90° angle toward the hypotenuse of the theoretical triangle to form an angle of approximately 33½ degrees with one of the sides forming said 90 degree angle, with all of said holes being useable for drawing lines when the template is used on any of its said three triangle-forming sides without causing the pencil to rotate the template around its corners.

3. The template defined in claim 2, with the two of said rows having their holes disposed at distances to provide for drawing parallel lines at .10" and ⅛" apart, respectively, when the template is used on one of its equal sides, with the third row having its holes arranged to draw lines in sets of three lines for lines of lettering with both capitals and lower case letters, and including a shorter row of at least four holes disposed to provide drawing of lines at approximately .075" apart when the template is used on its side.

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