March 28, 1944. M. R. HULL 2,345,477

DRAFTING INSTRUMENT

Filed Nov. 4, 1941

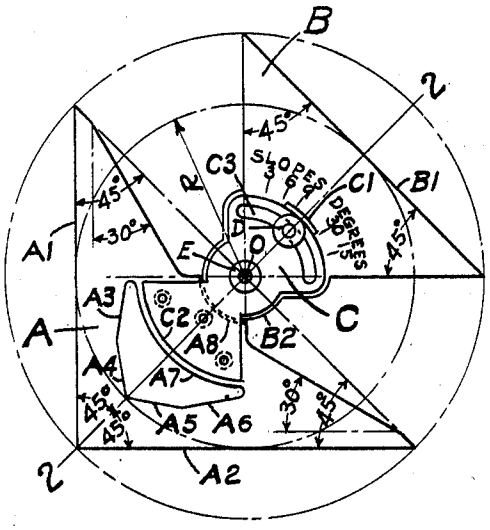


FIG. 1

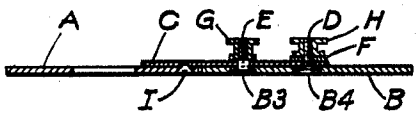


FIG. 2

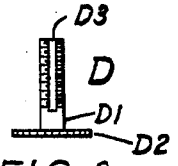


FIG. 3

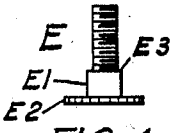


FIG. 4

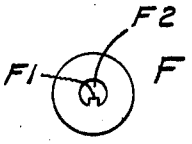


FIG. 5

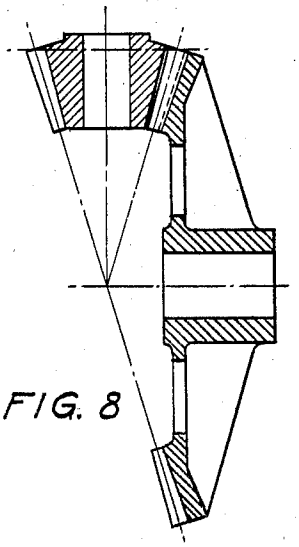


FIG. 8

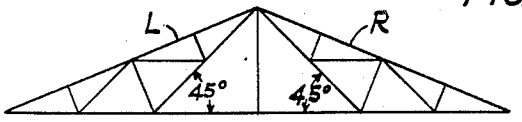


FIG. 7

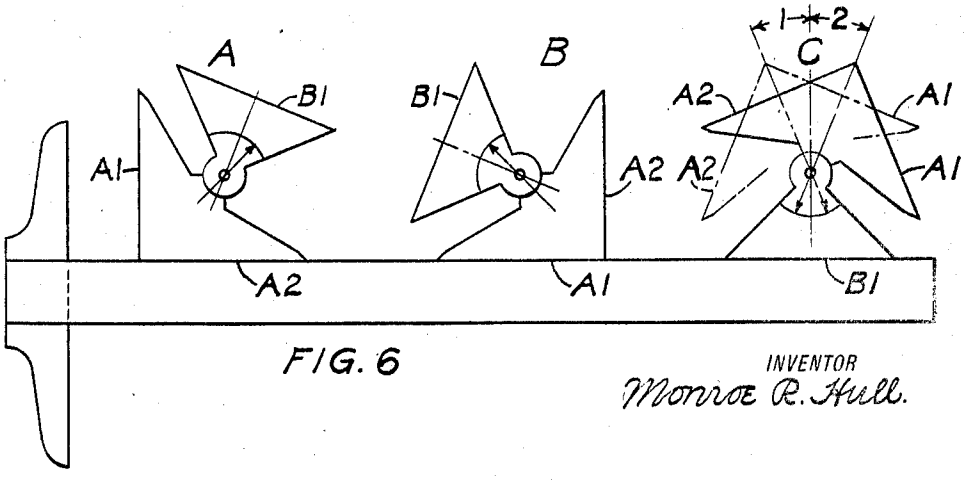


FIG. 6

INVENTOR

Monroe R. Hull.

Patented Mar. 28, 1944

2,345,477

UNITED STATES PATENT OFFICE

2,345,477

DRAFTING INSTRUMENT

Monroe R. Hull, Anaconda, Mont.

Application November 4, 1941, Serial No. 417,797

1 Claim. (Cl. 33—75)

For generations the conventional drafting tools, used when drawing straight lines, have been a T square or parallel ruler for drawing horizontal lines, a 45° triangle, a 30° x 60° triangle and a protractor for use in drawing lines at angles other than 30°, 45° and 60°.

The instrument I have invented is to be used in conjunction with a conventional T square or parallel ruler and is a combination of a modified 45° triangle, a modified 30° x 60° triangle and a protractor.

An object of this invention is to provide, at low cost, an instrument that will enable a draftsman to do accurate work more rapidly than can be done with separate triangles and protractor.

Another object is to provide a time saving instrument, precise in construction, pleasing in appearance, strong and durable and well balanced, having a protractor that may be quickly set and firmly locked in position.

A further object is to provide an instrument having one edge that may be set at any desired angle and when so set, it will have other edges for drawing lines at 30°, 45°, 60° and 90° and for drawing the sloping lines of the flanges of American standard I beams and channels.

A still further object is to provide two non-overlapping protractor scales giving the draftsman the option of setting the instrument by a scale of degrees or of slopes in inches per foot.

A fifth object is to provide an instrument that is especially useful for drawing symmetrical structures, such as roof trusses, towers, bevel gears, etc., since nearly all lines of such structures can be drawn at one setting of the protractor.

The construction, which makes possible the attainment of the various objects of this invention, is shown in the accompanying drawing in which:

Figure 1 shows an assembly of the instrument.

Figure 2 is a sectional view on line 2—2 of Figure 1.

Figure 3 is a detail of the clamp screw.

Figure 4 is a detail of the pivot screw.

Figure 5 is a detail of a washer for the clamp screw.

Figure 6 shows the instrument in various positions relative to a T square, as required to draw Figure 7.

Figure 7 and Figure 8 respectively show a roof truss and a pair of bevel gears. These are typical examples of work done with this instrument. Horizontal lines were drawn by the use of the T square. All other lines of Figure 7 and nearly all other lines of Figure 8 were drawn with the instrument at one setting of the protractor for each figure.

In Figure 6 the instrument, as shown in positions A and B and in the full lines of position C, has the same protractor setting. In position A side B1 is parallel to line R of Figure 7. In position B side B1 is perpendicular to line R. In position C (full lines) side A2 is parallel to line L of Figure 7 and side A1 is perpendicular thereto.

In position C (dot dash lines) side A1 is parallel to line R of Figure 7 and side A2 is perpendicular thereto.

It is obvious that angle 1 equals angle 2 (Figure 6, C) and that the draftsman may set side A2 parallel to line L of Figure 7 or side A1 parallel to line R.

This inherent characteristic makes it possible to provide two separate protractor scales each covering an arc of 45°. One of these scales is divided into equal spaces and marked in degrees and the other is divided into unequal spaces and marked in inches per foot of slope as roughly indicated in Figure 1.

General description

Figure 1 shows this instrument comprising two members, A and B, pivotally connected at O (by means to be later described) so that any required angular relation between them may be obtained. Clamping means (described later) hold A and B in the desired angular relation and this relation is shown on the protractor scale of B.

When parts A and B are set in the relation shown in Figure 1, they and part C are all symmetrical, in outline, about line 2—2. Parts A and B are so proportioned that sides A1, A2 and B1 are all of equal length and are all tangent to a circle of radius R centered at O.

Parts A and B are of thin, flat, preferably transparent, material of equal thickness and both are made to lie flat on the drawing board with no part of the instrument extending below their under surface.

These parts may be made of metal, but transparent or translucent material is preferred: such as "Celluloid" or a plastic material such as "Vinylite." They may be fabricated from sheets or cast in molds.

For part C, metal, such as "Duralumin," is preferred; however, parts A and C could be integral if cast in a mold.

Detailed description

Part A has a hole through it bounded by sides A3, A4, A5 and A6 and a circular arc A7, centered at O. Sides A3 and A4 are at slopes of 1 to 6 relative to side A1 and sides A5 and A6 have the same slopes relative to side A2. These are for use in drawing the sloping flanges of American standard I beams and channels. Arc A8 of part A has a radius slightly greater than arc B2 of part B. Arcs A8 and B2 are concentric about O.

Rigidly attached to the upper surface of part A, by countersunk head, screws I, or otherwise, is a connecting arm C which extends over part B a sufficient distance to receive clamp screw D, which is rigidly attached, as described later, to part B. Part C is terminated by circular arcs C1 and C2 centered at O. Arc C1 is of sufficient length to accommodate a vernier scale to be used in conjunction with the protractor scale of part B. Part C contains a circular slot C3, the length and width of which are such as to allow the cylindrical portion D1, of clamp screw D, to swing freely therein through an arc of 90° about the center O. The center line of this slot has a radius of .375 R. (Preferably.)

Part C has a cylindrical bore, centered at O, to fit snugly and rotate on the cylindrical portion E1 of pivot E shown in Figure 4.

Part B has two bored and counterbored holes, B3 and B4 (Figure 2) located on its center line, or line of symmetry. Hole B3, centered at O, is to receive pivot E of Figure 4 and hole B4 is to receive clamp screw D of Figure 3. The center to center distance of these holes is preferably .375 R. The bore and counterbore B3 are to fit tightly the shank E1 and knurled head E2 of pivot E and the bore and counterbore B4 are to fit tightly the shank D1 and knurled head D2 of clamp screw D so that D and E are firmly set into part B and cannot turn therein.

Washer F (Figure 5) is located between nut D and arm C (Figure 2) and its function is to facilitate accurate "setting of the part B in its angular relation to part A. Rotation of washer F is prevented by an integral key F1, in opening F2, which slides in the keyway D3 of clamp screw D. Nut H is threaded to fit the threaded portion of clamp screw D and, when tightened, parts B and C are firmly clamped together.

Pivot E (Figure 4) has no clamping effect, and nut G is turned relative to E, only when assembling the instrument or taking it apart. The cylindrical portion E1 is of such length as to extend through and slightly above part C, and nut G (Figure 2) is screwed tightly against shoulder E3. Nut G, which is near the center of gravity, is grasped when the instrument is to be lifted or rotated.

Prior to my invention drafting instruments have been made having two members pivotally connected in adjustable angular relation, and, therefore, I do not claim broadly such a combination:

But, I claim:

A drafting instrument consisting of two principal triangular members having adjustable angular relation about a common central pivot which is located at the center of the hypotenuse of the first member and at the apex of the second member, the first member having two exterior straight sides of equal length at 90° to each other and at 45° to its line of symmetry, two interior straight sides of equal length each of which is at an angle of 30° to one of the exterior sides, the second principal member being a 45° triangle the hypotenuse of which is of the same length as one of the exterior sides of the first member.

MONROE R. HULL.