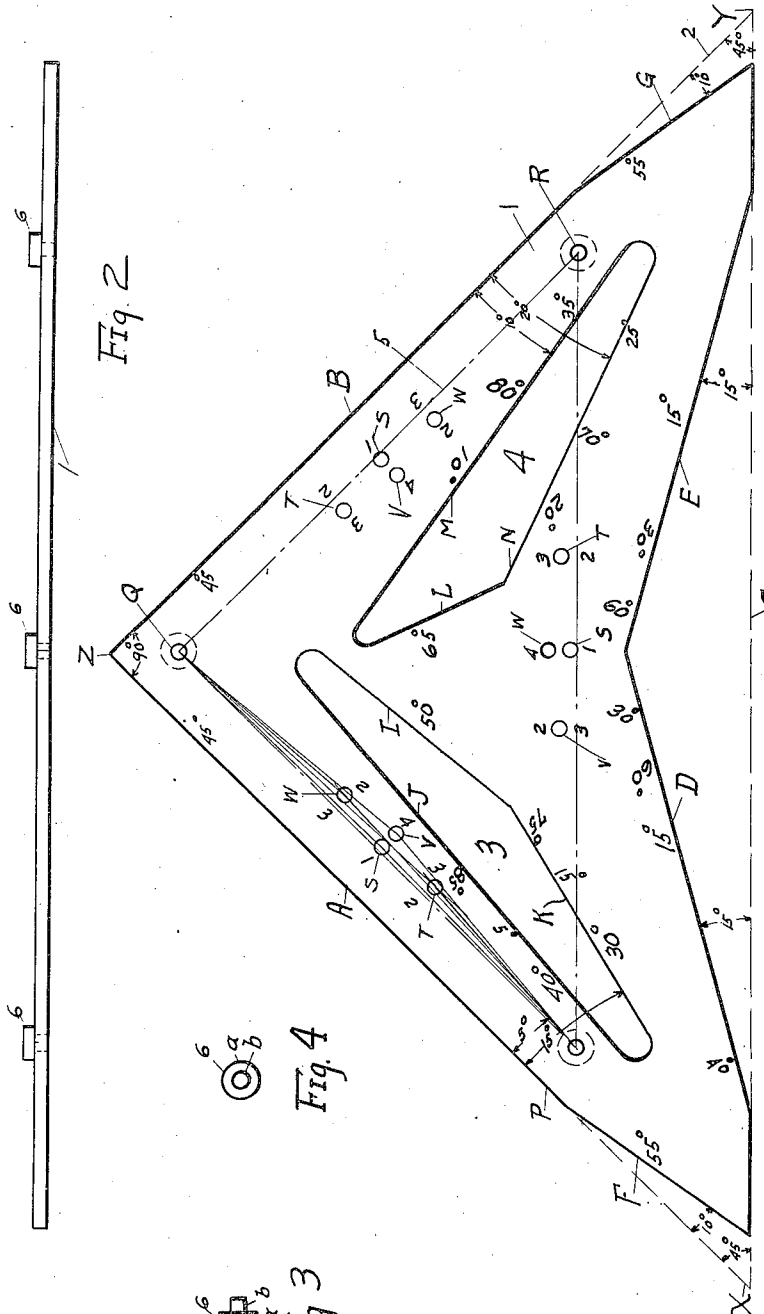
Feb. 16, 1932. S. T. SMITH 1,845,449

PROTRACTOR TRIANGLE

Filed May 11, 1929 2 Sheets-Sheet 1



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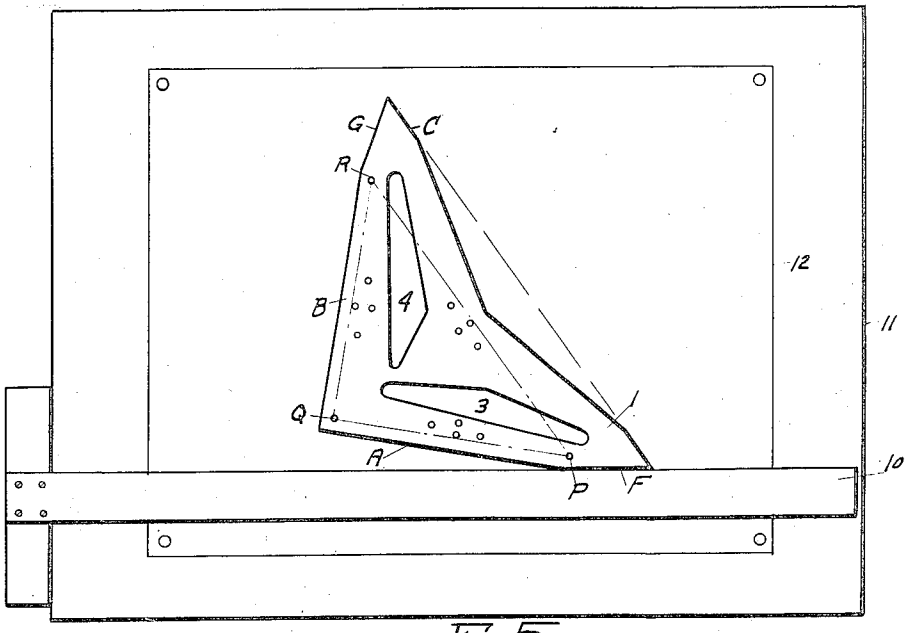

Fig. 5

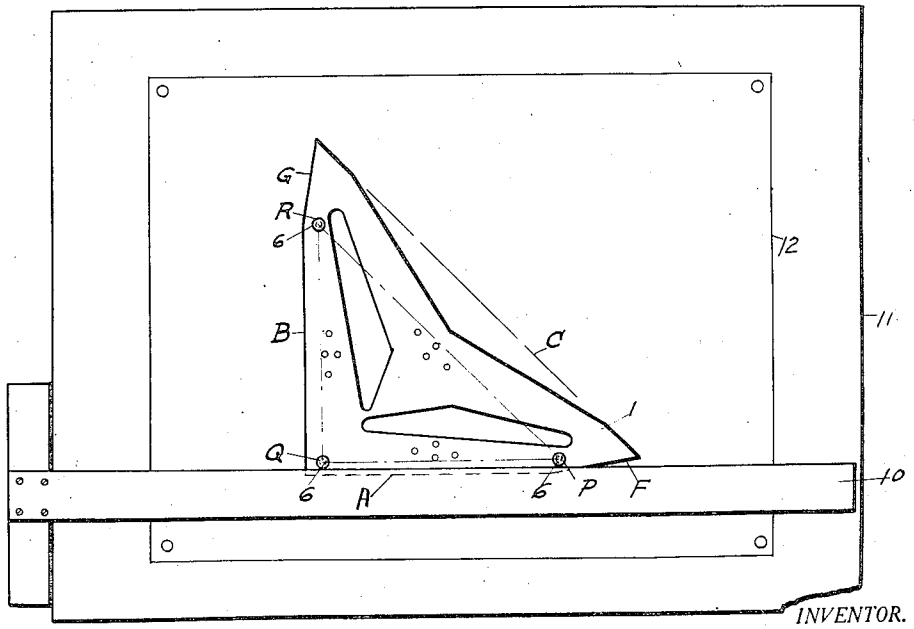

Fig. 6

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UNITED STATES PATENT OFFICE

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PROTRACTOR TRIANGLE

Application filed May 11, 1929. Serial No. 362,253.

My invention relates to a combination draftsman's triangle, adapted for special drawing and lay-out work.

The object of my invention is to produce a special triangle that will replace and substitute for all of the various triangles now generally required by draftsmen in designing and lay-out work.

Another object is to produce a special triangle that can not only be used as an ordinary triangle for drawing, but will function as a protractor as well, for each angular degree or for various multiples of some predetermined number of degrees.

A further object is to produce a combination protractor triangle, that is simple in construction, on which the various angles may easily be selected and accurately transcribed to drawings and can be manufactured at a very low cost.

These several objects are attained in the preferred form by the construction and arrangement of parts more fully hereinafter set forth.

Similar parts on all drawings are marked by similar letters or numerals.

Fig. 1 illustrates a plain view of the triangle, showing the general arrangement of the angularly positioned edges formed thereon, together with the variable means for obtaining single degree angles therefrom.

Fig. 2 is an edge view of the triangle, as shown in Fig. 1, showing the plugs mounted therein.

Fig. 3 is a side view of one of the plugs, showing its general structure.

Fig. 4 is an end view of the plug, shown in Fig. 3, showing the relative position of the stem and head.

Fig. 5 illustrates the application of my protractor triangle as may be used in combination with the ordinary T-square and drawing board for transcribing various angles therefrom.

Fig. 6 also illustrates a further use of the protractor triangle when applied to the T-square with respect to the buttons, for transcribing single degree angles therefrom.

I will now describe more fully the detailed construction of my device, referring to the drawings and the marks thereon.

In general, to attain the results from my triangle, I utilize the form of the ordinary 45 degree triangle, and cut therein a series of angularly positioned edges, each formed at different angles with one of the external edges of the triangle, and all so arranged and placed with respect to the three main outer edges that a series of multiple angles may readily be obtained from the different angular edges, ranging from zero to 90 degrees, the several edges varying by a constant fixed number of degrees, preferably 5 degrees, as used in this case, each edge representing a multiple angle of 5 degrees with respect to one of the three triangle edges. Mounted along each edge of the triangle is a series of plug recesses, capable of receiving special plugs therein, variable by one degree each, ranging from 1 to 4 degrees, thereby making it possible to transcribe from the various triangle edges any desired degree from 1 to 90 degrees.

The triangle 1 is made from a thin sheet of hard, stiff material, preferably celluloid, rubber or metal, or any other suitable material that is adapted to this class of instrument, where accuracy in form must be maintained, and designed from an isosceles triangular section 2, having the edges A and B positioned to form 45 degree angles X and Y with the base line edge C and also forming a 90 degree angle Z at the apex. Through the central section of the base edge C is cut a V-shaped incision defined by the edges D and E, each being a straight edge positioned at 15 degrees with the base line C, leading in the opposite direction. Also the sides A and B are cut near the base line for allowing the edges F and G, each being a

straight edge, and positioned at a 10 degree angle with the edges A and B respectively. Within the triangle 1 are formed two triangular openings 3 and 4 extending through the thin sheet material, the opening 3 being defined by the straight wall edges I, J and K, and opening 4 being defined by the straight wall edges L, M and N. The edges J and K of the opening 3 are positioned at 5 and 15 degrees respectively with the edge A, while the edges M and N of the opening 4 are positioned at 10 and 20 degrees respectively with the edge B of triangle 1. The edge I of the opening 3 is positioned at an angle of 50 degrees with the edge C of triangle 1. The edge L of the opening 4 is positioned at an angle of 65 degrees with edge C of triangle 1. By the various internal and external edges as form on the triangle 1, all of the multiples of 5 degrees between zero and 90 degrees may be transcribed directly from the triangle to the drawing when used in conjunction with the ordinary T-square 10. By resting the edge A of the triangle 1 on the edge of a T-square 10 when positioned over a drawing board 11 and drawing 12 similarly positioned to that shown in Fig. 5, the angles 5, 15, 30, 45, 60, 70, 80, and 90 degrees with the horizontal line of the T-square can be transferred directly to the drawings from the edges J, K, D, C, E, N, M, and B respectively, and by tilting the triangle 1 on the edge of the T-square 10 to the edge F, as shown in Fig. 5, the added angles 25, 40, and 55 degrees, with respect to the horizontal line of the T-square, may also be obtained from the edges K, D and C respectively, together with various duplicate angles obtained on edge A. Also by resting the edge B of the triangle 1 on the edge of the T-square 10, the intervening angles of 10, 20, 75, and 85 degrees may be obtained and transferred to the drawing from the edges M, N, K and J respectively. Also by placing the edge C of the triangle 1 on the edge of the T-square 10, the added angles of 35, 50, and 65 degrees with the horizontal edge of the T-square may be obtained from the edges M, I and L respectively, together with various duplicate angles derived from the other triangle edges A and B. By this combination of edges, all of multiple angles of 5 degrees, varying from zero to 90 degrees, are obtainable from the triangle edges for transcribing directly therefrom to the drawing 12. Near the angles X Y and Z of the triangle 1 are formed three zero plug recesses P, Q and R extending through the triangle sheet material accurately located at the angles of a similar secondary triangle 5, having its respective sides parallel to the edges A, B and C. Along edge A of triangle 1 centrally positioned between the zero plug recesses P and Q are formed four angle plug recesses S, T, V and W, positioned respectively at intersections of the 1, 2, 3 and 4 degree lines, extending from each plug recess P and Q inside the secondary triangle line. Likewise, a similar series of angle plug recesses are formed along the edges B and C of triangle 1, also centrally positioned between the respective zero plug recesses, in the same manner as described for edge A Small plugs 6 are provided, formed with the head *a* and stem *b*, accurately turned from hard, rigid material, such as celluloid, hard rubber, fiber, or steel, or any other suitable material capable of fitting accurately the plug recesses of the triangle 1 and may be inserted within any of the said plug recesses or removed therefrom at will, the stem *b* being of a size to accurately fit and retain the plug within the recesses, preferably by comparatively tight fit. The head *a* projecting outside of the triangle side face, as shown in Fig. 2, is designed to form engaging means for the edge of the T-square 10. At least two of the plugs 6 are required for operating the triangle in obtaining single degree angles therefrom. By inserting the plugs 6 in the zero plug recesses P and Q, and engaging the head *a* of the plug with the edge of the T-square 10, as shown in Fig. 6, the triangle will be positioned thereon, having said edge A parallel with the T-square edge the same as though edge A of the triangle rested directly thereon, as indicated in Fig. 5, although in another position. Likewise, should the plugs 6 be placed in the holes Q and R or R and P and then engaged with the T-square edge, the triangle will remain with the edges B and C parallel to the T-square edge, similar as stated on edge A. By inserting one of the plugs 6 in one of the angle plug recesses S, T, V or W, and then allowing the heads *a* of both plugs to rest on the edge of the T-square 10, the triangle 1 will be tilted thereon accordingly either 1, 2, 3, or 4 degrees, depending upon which of the angle plug recesses may be employed, and likewise tilting all of the edges of the triangle accordingly and varying the resulting angles, which may be transcribed therefrom direct to the drawings by 1 to 4 degrees. The same applies to the angle recesses on sides B and C, thereby providing means whereby all of the angles from 1 to 90 degrees may be obtained from the triangle edges and transcribed directly to the drawings.

By inter-changing one of the plugs with plug of different head diameter, a still finer angular adjustment may be obtained, where the slight increase in diameter of one plug head is pre-determined to tilt the triangle only a fraction of a degree, preferably one-half (½) degree, thereby making it possible to obtain all angles variable by ½ degrees between zero and 90 degrees for all of the multiple angle edges.

Further, by utilizing a standard plug in

one of the zero plug recesses, and a series of variable sized plug heads in the other zero plug recess, each successive plug head varying in diameter of amount required to tilt the triangle an added degree angle or fraction of a degree, the single degree angle adjustment or modification thereof may readily be obtained by interchanging the variable plugs with the head diameters pre-determined for tilting the triangle the required number of degrees and without using the intermediate single plug recesses.

Having fully described my protractor triangle, what I claim as my invention and desire to secure by Letters Patent is:

1. A protractor triangle adapted for scribing various angled lines on drawings, comprising a triangular sheet of rigid material, having internal openings, and formed with a series of internal and external straight line edges, each edge positioned at some multiple angle of a pre-determined number of degrees, forming a complete series of multiple angles varying from zero to 90 degrees, there being plug holes formed in said triangular sheet, plugs adapted for securement in said holes, positioned along the various external edges, each pair of holes determining with an adjacent edge of the triangle, an angle equal to units of the least division for which the edges are designed.

2. A protractor triangle adapted for scribing various angled lines on a drawing, comprising a triangular sheet of rigid material, formed with equal sides positioned at right angles to each other and having triangular openings therein, forming a series of internal and external straight line edges positioned at some multiple angle of some pre-determined number of degrees, with at least one external triangle edge, forming a complete series of multiple angles between zero and 90 degrees, there being plug holes formed in said triangular sheet, plugs adapted for securement in said holes, positioned along the external triangle edges, each pair of holes determining with an adjacent edge of the triangle, an angle equal to units of the least division for which the edges are designed.

3. A protractor triangle adapted for scribing various angled lines on a drawing, comprising a triangular sheet of rigid material, formed with equal sides positioned at right angles to each other, and having internal triangular openings therein, forming a series of internal and external straight line edges, positioned at some multiple angle of five degrees with at least one external triangular edge, forming a complete series of multiple angles varying from zero to 90 degrees, said triangular sheet being formed with three zero plug holes, each positioned near one of the external angles of the triangle, and positioned in parallel alignment with the external triangle edges, also there being intermediate plug holes formed along each external edge of the triangle, positioned at the intersection of single degree lines from one to four degrees, intersecting the various zero plug hole centers, plugs adapted for securement in said plug holes and project from the triangle surface for engaging a T-square edge.

In witness whereof, I sign these specifications.

SKARDON T. SMITH.