

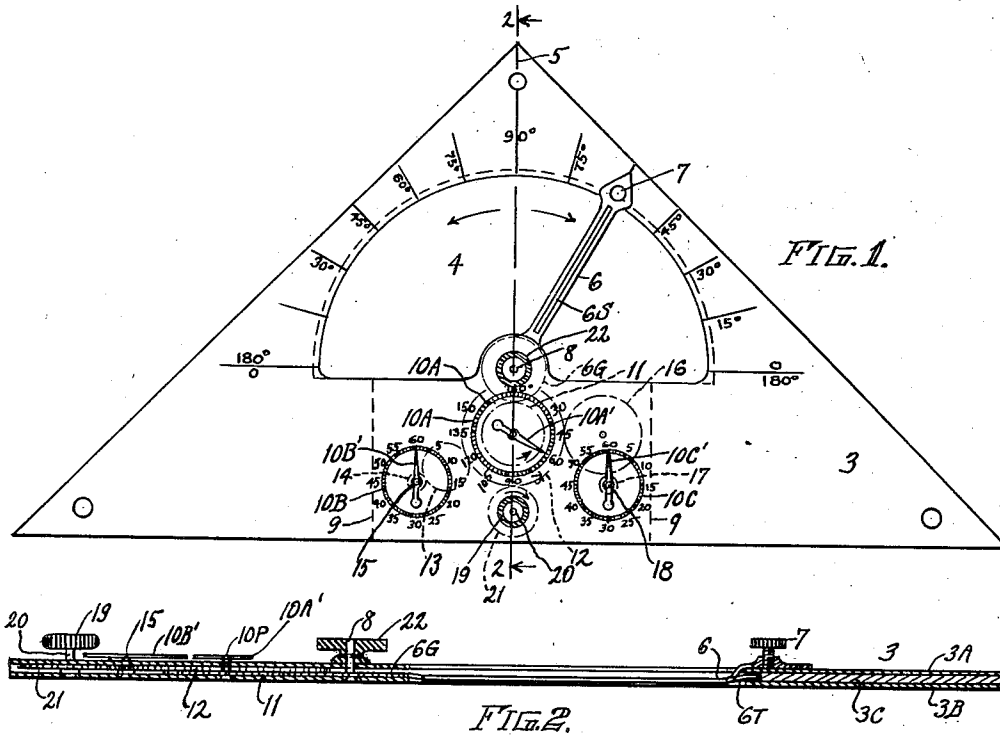
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TRIANGLE PROTRACTOR

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TRIANGLE-PROTRACTOR

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4 Claims. (Cl. 33—75)

My invention relates to improvements pertaining to drafting, surveying and engineering instruments and known as triangle-protractors and the main object is to provide a device the use of which enables any one to locate and draw angular lines according to exact calculations. This device, used as hereinafter set forth, locates angular lines exactly and not approximately as hitherto done. The beam of this device can be set to any specified angle, or part thereof, within the scope of the protractor limits, down to exact calculated minute, or second, or vice-versa to determine the exact angle of a given line.

The construction and operation of my improved triangle-protractor are herein fully set forth, reference being had to the accompanying drawing, in which,—

Fig. 1 is a face view of a 90 degree triangle-protractor embodying my improved means. Fig. 2 is an enlarged, central, sectional view as on line 2—2 in Fig. 1.

Referring to the drawing by reference numerals, 3 designates a so-called 90 degree or isosceles triangle provided with an approximately semi-circular opening 4 bisected by the line 5 which line also bisects the apex of the triangle. The arcuate edge of said opening may have any suitable number of graduations 6, not necessarily all the degrees, such graduations shown 90 degrees each side of line 5 or 180 degrees all told. The lower edge of the aperture 4 is below the center, there being a central projection 3A in which is pivotally retained a beam 6. Said beam, throughout its main length is of flat material, lying preferably close to or in light contact with the surface on which the triangle rests and said part of the beam is provided with a slot 6S. The free end of the beam comprises preferably an arrow-like head contacting the upper face of the triangle and carries a set-screw 7 to hold the beam at any point.

The pivot end of the beam may comprise a gear 6G retained on the pin 8 which is the center of the protractor.

At this point it must be clearly understood that this triangle is laminated, comprising like upper and lower plates 3A—3B and an intermediate plate 3C similarly shaped but having a gap, as between the dotted lines 9—9 in Fig. 1, below fulcrum 8 and to the lower and longer edge of the triangle thus providing housing means for certain gears and manipulating means which will now be described.

The beam 6 is preferably formed with an integral outwardly directed tongue 6T slidably

guided in a groove formed between 3A—3B for steadying its movement and counteracting pressure of the set screw 7.

In proximity to the protractor center 8, I provide a number of dials on the upper face of the triangle, preferably a degree indicating dial 10A, a minute indicating dial 10B and a second indicating dial 10C, each with a hand as 10A', 10B' and 10C' in the respective order.

The beam gear 6G is operatively connected by a train of gears with the various dials, the hands of the latter rotating each with a concealed gear in pocket 9, it being understood that all the required gears are fixed on vertical shafts traversing the pocket 9 and journaled in both the bottom and top layers 3A—3B.

In a preferred embodiment of my device the dial 10A is a complete circle divided into 180, its hand 10A' initially set on the 90 mark when the beam 6 points to and registers 90 on the protractor. Simultaneously the hand 10B' sets at the 60 mark on the minute dial and the second hand 10C' is on the 60 mark of dial 10C. The beam gear 6G meshes with a gear 11 on a common pivot 11P of hand 10A'. Said pivot 11P carries another gear 12 meshing with an idler gear 13 which in turn meshes with a pinion 14 fixed on the shaft 15 which carries the minute hand 10B'.

The proportions of gears, pinions must be such that the second hand 10B' rotates exactly 60 times for each degree of movement of the degree hand 10A' and the corresponding idler gear 16 and pinion 17 on shaft 18 of second hand 10C' proportioned to turn the latter hand 60 times for each degree of movement of the second hand 10B'.

19 is a manipulating button fixed on a vertical shaft 20 carrying a gear 21 meshing preferably with gear 12. Manipulation of this button provides for locating the beam 6 at any desired angle and exactly to any calculated or desired degree, minute and second. For example in Fig. 1 the beam is set exactly on 60 degrees but by manipulation of button 19 the beam may be moved to any minute or second between 60 and 59 or 60 and 61. When adjusted to desired position the beam may be set at 7 and a correct line drawn with a pencil point or other marker in the slot 6S. 22 is a beam manipulating button fixed on the pin 8.

It will now be readily understood that the lower edge of aperture 4 is below the pin 8 for the purpose of allowing the beam 6 to move freely the full 180 degrees indicated on the protractor. It

will also be clearly understood that this device is applicable to other types of triangles, squares and straight-edge devices it being necessary to have a straight base line as the bottom edge of the triangle in Fig. 1 and the vertical, transverse line 5. The same principle of protracting degrees, minutes and seconds will apply to surveyors', engineers', architects' and possibly other instruments, for vertical, horizontal and any angular reading 10 or calculation. In other words my device is serviceable in both field and drafting use. Therefore, it is not confined to a fixed position or carriage but applicable to a rotating axis.

The use of my device has been clearly disclosed 15 in the foregoing description. Modifications, within the scope of the following claims, may be made without departing from the scope and spirit of the invention.

In Fig. 1 the pitch lines only of the various 20 gears are indicated by dotted lines.

The dials and their respective hands are preferably covered by any suitable transparent material separately or collectively.

I claim:

25 1. A triangle-protractor comprising a triangular flat member, an approximately semi-circular aperture therein and a line at right angles to one side of said member bisecting the aperture, a beam pivotally mounted concentric of said aperture and its fulcrum comprising in part a gear, 30 said triangle being laminated and comprising a pair of identical members and an intermediate member connecting the said pair, an aperture provided in the intermediate member and comprising a gear housing, gears mounted in said 35 housing and dials on certain of the shafts of said gears and concentric of said dials one over each dial, said gears in mesh and proportioned to position said hands to indicate on the dials the exact position of the beam in degrees, minutes 40 and seconds.

2. The structure specified in claim 1, and a manipulating device for operating said dial means 45 and the beam, comprising an upright shaft, a rotatable manipulator button or the like, a gear on said shaft in operative mesh with the dial gears, said button positioned over and in proximity to the upper face of the triangle.

3. In an angle-reading and locating device comprising a flat triangular frame of isosceles form with its longer edge comprising the base and having a vertical line bisecting the apex, a beam 5 fulcrumed on said latter line, said frame provided with an aperture having an arcuate edge concentric of said fulcrum and extending below said fulcrum for clearance of said beam, and said beam provided with an elongated straight slot 10 extending radially from the fulcrum, said frame comprising a pair of spaced identical members and said fulcrum part comprising a primary gear, a train of gears mounted between said pair of frame parts to rotate in a common plane with the 15 primary gear, rotatable indicator hands on certain of the shafts of said gears and over the upper face of the frame, a dial for each said hand, one dial to indicate the angular position of the beam in degrees, another hand to indicate said position in minutes and a third hand to indicate 20 the said position in seconds.

4. A triangle-protractor comprising a flat member, an approximately semi-circular aperture therein and a line at right angles to one side of said member bisecting the aperture, a beam slot- 25 ted longitudinally intermediate its ends and pivotally mounted concentric of said aperture and its fulcrum comprising in part a gear, said main member being laminated and comprising a pair of identical members and an intermediate member, an aperture provided in the intermediate 30 member and comprising a gear housing, gears mounted in said housing and dials on certain of the shafts of said gears and concentric of said dials one over each dial, said gears in mesh and proportioned to position the hands to indicate on 35 the dials the exact position of the beam, the slotted part of said beam offset downwardly to lie in a flat plane close to the surface on which the protractor is laid, the outer end of said beam 40 comprising a pointed indicator head adapted to ride freely on the surface of the protractor adjacent the arcuate edge of the aperture, protractor degree markings on said part of the frame reading 45 similarly from both sides of the vertical line and over which said point is movable, and means to hold said head in any desired position.

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