

UNITED STATES PATENT OFFICE.

GEORGE W. SYKES, OF MERCER, PENNSYLVANIA, ASSIGNOR OF ONE-HALF
TO WILLIAM E. MCKELVY, OF PITTSBURG, PENNSYLVANIA.

PROTRACTOR.

SPECIFICATION forming part of Letters Patent No. 621,177, dated March 14, 1899.

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To all whom it may concern:

Be it known that I, GEORGE W. SYKES, a citizen of the United States, residing at Mercer, in the county of Mercer and State of Pennsylvania, have invented or discovered a new and useful Improvement in Protractors, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a face view of my improved protractor. Fig. 2 is a detail view of a modified construction, on an enlarged scale, illustrating more fully the extended arm and the device for securing the limb at any position. Fig. 3 is a detail view illustrating a modified form of arm employing a curved edge to secure equal subdivisions and showing the locking device withdrawn.

My invention relates to protractors; and it consists in means whereby the users of such devices are enabled to easily and quickly subdivide the degrees of a circle into minutes with but one setting of the instrument. Ordinarily such subdivisions are made by the use of a vernier-scale, requiring a separate setting for each reading of the instrument and causing considerable trouble, tiring of the eyes, and liability to error, while by my improvement the operation is rendered extremely simple, expeditious, and accurate.

Referring now to the drawings, 2 is the semi-circular base of a protractor provided with the usual divisions into degrees. To the center of the base, at 3, is pivoted a radial limb 4, at any convenient point of which is located an indicating-point 5, coinciding with the medium line of the limb and from which line all subdivisions are made. In the detail views shown in Figs. 2 and 3 this point 5 is replaced by a locking device of any convenient character, such as a sliding dog 6, provided with teeth adapted to engage similar recesses in the periphery of the protractor, corresponding to degrees, so that when the dog is withdrawn and inserted in the next space the movement will correspond to one degree. The dog 6 is provided with a thumb-piece 7, by which it may be retracted, and a pressure-spring 8 tends to counteract outward pres-

sure and to reinsert the teeth, while suitable guiding devices assist to keep it in alinement.

The portion of the instrument which constitutes the particular feature of the present invention is an extended arm 9, formed integral with and constituting an extension of the radial limb. The edge 10 of this arm, which may be curved or straight, is sufficiently deflected from alinement with the medium center *a a* to correspond to exactly one degree on the protractor between the extremities *b c* of the arm or to any predetermined subdivision, as may be desired. It is obvious also that the length of such arm between the points *b* and *c* may be subdivided so as to correspond to the second subdivisions of a degree, and by laying off any predetermined reading in the second column by the divisions on the arm 9 in addition to the already determined number of degrees the line of the angle may be at once described without further movement of the instrument.

It will be seen that in the case of an arm having a straight edge the subdivisions will gradually increase toward its extremity owing to the divergence of the radial lines of measurement, whereas by intersecting such lines by cross-lines at regular even distances the intersections will describe a curved line, to which line the edge may be made to conform, as in Fig. 3, thus giving even subdivisions, although either construction will be found to be equally accurate and satisfactory.

The advantages of my invention will be appreciated by the skilled engineer and it will be found applicable to a wide variety of use by users of this class of instruments.

The construction of the locking device or point-indicator may be varied within the scope of my invention, and I do not desire to be limited to the construction shown, but to include such variations or modifications thereof as will suggest themselves to the skilled mechanic.

What I claim is—

1. A protractor provided with a pivoted radial limb and an extended arm having an edge deflected from the radial line and provided with subdivisions, substantially as set forth.

2. A protractor provided with peripheral
teeth corresponding to the degrees of the cir-
cle, a radial limb pivoted at the center of the
protractor, a setting device for locating the
5 limb, and an extended arm bearing a scale
for indicating subdivisions of a single degree,
substantially as set forth.

In testimony whereof I have hereunto set
my hand.

GEORGE W. SYKES.

Witnesses:

C. M. BROWN,

W. E. MCKELVY.