April 30, 1946. N. C. SMITH 2,399,579

PROTRACTOR

Filed Feb. 18, 1944

Fig. 1

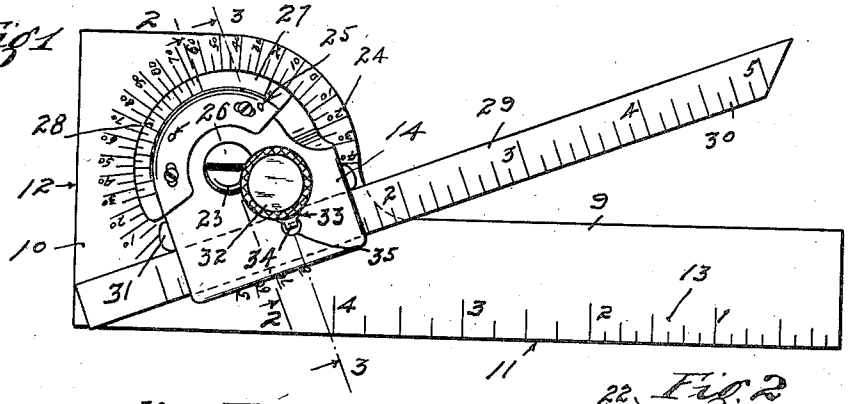


Fig. 3

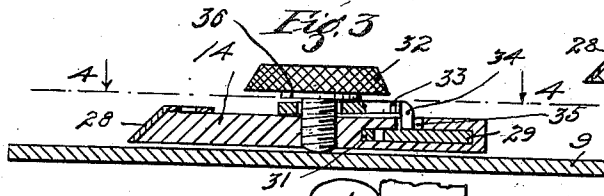


Fig. 2

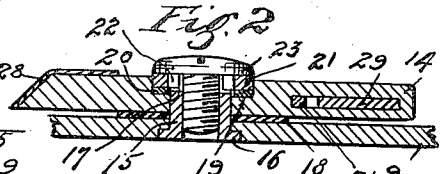


Fig. 4

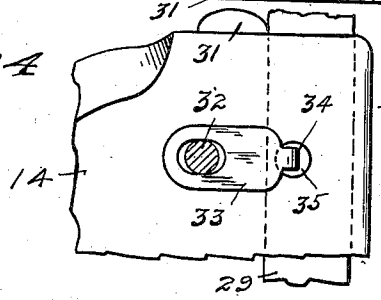


Fig. 5

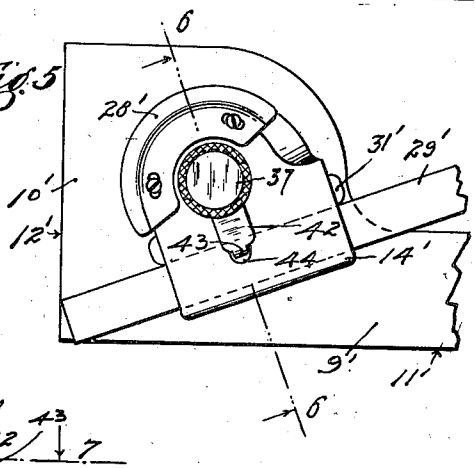


Fig. 6

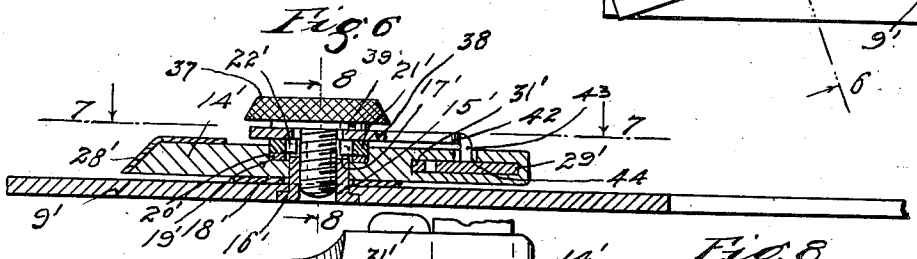


Fig. 7

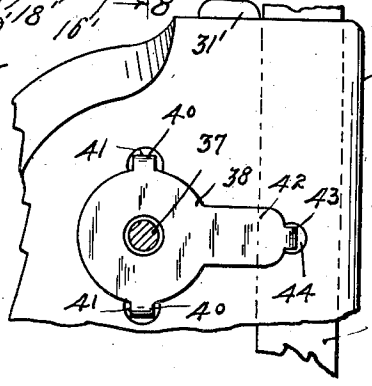
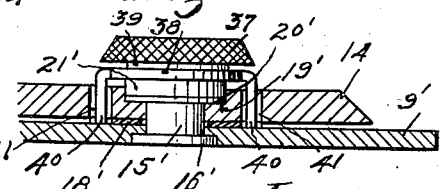


Fig. 8



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PROTRACTOR

Neil C. Smith, Minneapolis, Minn.

Application February 18, 1944, Serial No. 522,941

4 Claims. (Cl. 33—102)

My present invention relates to improvements in protractors.

More particularly, this invention is in the nature of an improvement on or refinement of the protractor disclosed and claimed in United States Letters Patent No. 2,316,189, issued April 13, 1943, to Timothy A. Schaefer, inventor, and assigned to the Industrial Engineering Co. Inc.

The principal object of this invention is the provision of novel means for locking the movable elements of the protractor where adjusted.

To the above end, the invention consists of the novel devices and combination of devices hereinafter described and defined in the claims.

In the accompanying drawing, which illustrates the invention, like characters indicate like parts throughout the several views.

Referring to the drawing:

Fig. 1 is a plan view of a protractor having one form of the invention embodied therein;

Fig. 2 is a fragmentary detail view principally in section taken on the line 2—2 of Fig. 1, on an enlarged scale;

Fig. 3 is a view principally in section taken on the line 3—3 of Fig. 1, on an enlarged scale;

Fig. 4 is a fragmentary detail view partly in plan and partly in section taken on the line 4—4 of Fig. 3;

Fig. 5 is a fragmentary plan view of a protractor having another form of the invention embodied therein;

Fig. 6 is a view principally in section taken on the line 6—6 of Fig. 5, on an enlarged scale;

Fig. 7 is a fragmentary detail view partly in plan and partly in section taken on the line 7—7 of Fig. 6; and

Fig. 8 is a fragmentary detail view partly in elevation and partly in section taken on the line 8—8 of Fig. 6.

Referring first to the invention shown in Figs. 1 to 4, inclusive, the numeral 9 indicates the body of a protractor and which body is in the form of a blade having parallel longitudinal edges. One end portion of the body member 9 is enlarged to afford a head 10. One of the longitudinal edges of the body 9 affords a long straight-edge 11 that extends the full length thereof. The end of the body 9 at the head 10 affords a short straight-edge 12 which extends at right angles to the first noted straight-edge. A scale 13 graduated in inches and fractions thereof is marked on the body member 9 at the long straight-edge 11.

A turret 14 is attached to the head 10 to turn about a tubular pivot 15 in a plane parallel to the plane of the body 9. This pivot 15 is internally screw-threaded and has on one end an external annular flange 16 countersunk in the head 10 at its back and rigidly secured thereto. The pivot 15 is located exactly the same distance from the two straight-edges 11 and 12 and has in its outer end two diametrically opposite keyways 17.

A large thin washer 18 on the pivot 15 is interposed between the head 10 and the turret 14. In the face of the turret 14 is a depression 19 that is concentric with the pivot 15. A relatively thin washer 20 on the pivot 15 rests on the bottom of the depression 19 and a relatively thick washer 21 rests on the washer 20 and extends outwardly of the pivot 15. Keys 22 on the washer 21 extend into the keyways 17 and hold said washer from turning on the pivot 15, but with freedom for relative axial movement. A screw 23 for clamping the turret 14 onto the washer 18 has a large head that engages the washer 21. By tightening the screw 23 the turret 14 may be frictionally held from turning relative to the body 9 so as to remain where adjusted. Obviously, the pivot 15 acts as a fixed nut for the screw 23.

More than one-half of the turret 14 is on the arc of a circle and concentric with this circle is an annular scale 24 having two diametrically opposite zero points 25 and 26. Each quadrant of the scale 24 is divided into ninety degrees (90°) reading in opposite directions from each zero point. The degree reading at the zero point 25 is the required angle and the degree reading at the zero point 26 is the component angle.

Mounted on the turret 14 is an adjustable vernier plate 27 on which appears a vernier scale 28 for co-operation with the scale 24.

A long thin arm 29 is mounted in the passageway in the turret 14 for endwise sliding movement in a plane parallel to the plane of the body 9. One end of the arm 29 extends at a right angle to the longitudinal edges thereof and the other end of said arm is on an angle of forty-five degrees (45°). A scale 30 on the arm 29 is graduated into inches and fractions thereof. The arm 29 is frictionally held where endwise adjusted relative to the turret 14 by a spring member 31.

To simultaneously lock the turret 14 relative to the body 9 and the arm 29 relative to the turret 14, I provide a thumbscrew 32 having a knurled head for locking the turret 14 to the body member 9 and an elongated washer-like member 33 for locking the arm 29 relative to the turret 14. The screw 32 has threaded engagement with the

turret 14 and impinges the body 9 and the member 33 has an elongated hole near one end through which the screw 32 extends. The member 33 at its short end rests on the turret 14 and on the long end of said member is a laterally projecting or depending finger 34 that extends through a hole 35 in the turret 14 and impinges the arm 29. A large annular boss 36 on the under side of the head of the screw bears against the member 33 and holds said head spaced from the member 33. The length of the finger 34 is such as to hold the member 33 out of contact, except at its short end, with the turret 14 and in a slightly inclined position, see Fig. 3.

Referring now to the invention shown in Figs. 5 to 8, inclusive, wherein parts that correspond to like parts in Figs. 1 to 4, inclusive, are given the same reference numerals followed by a prime (').

In the structure shown in Figs. 5 to 8, inclusive, a single thumb-screw 37 having a knurled head and a co-operating washer 38 perform the same functions as the two screws 23 and 32, and the washer-like member 33 shown in Figs. 1 to 4, inclusive. The screw 37 has threaded engagement with the tubular pivot 15' and loosely extends through the hole in the washer 38. Said washer 38 is interposed between the head of the screw 37 and the washer 21'. A large boss 39 on the under side of the head of said screw bears on the washer 38. Formed with the washer 38 are two diametrically opposite and laterally projecting or depending fingers 40 which extend through the holes 41 in the turret 14' and impinge the head 10. Also formed with the washer 38, midway between the fingers 40, is an extension 42 having on its outer end a laterally projecting finger 43. This finger 43 extends through a hole 44 in the turret 14' and impinges the arm 29'.

The initial tightening of the screw 37 will frictionally clamp the turret 14' and hold the same where adjusted relative to the head 10. Further tightening of the screw 37 will press the fingers 40 into the head 10 and the finger 43 onto the arm 29' and thereby positively hold the turret 14' and the arm 29' where adjusted.

What I claim is:

1. The combination with a body member, of a turret on the body member, an arm mounted on the turret for endwise sliding movement, a member having a depending finger impinging the arm, and a screw operable on the member to simultaneously hold the turret against pivotal movement relative to the body member and to hold the arm against endwise sliding movement relative to the turret.

2. The combination with a body member, of a turret on the body member, an arm mounted on the turret for endwise sliding movement, a member, one end of which engages the turret and having on its other end a depending finger extending through a hole in the turret and impinging the arm, and a screw extending through an aperture in the member and operable on the member to simultaneously hold the turret against pivotal movement relative to the body member and to hold the arm against endwise sliding movement relative to the turret.

3. The combination with a body member, of a turret, means including a headed screw for pivotally connecting the turret to the body member, an arm mounted on the turret for endwise sliding movement, and a washer on the screw having depending fingers impinging the body member and the arm, said screw being operable on the washer to clamp the fingers onto the body member and the arm.

4. The combination with a body member, of a turret, means including a headed screw for pivotally connecting the turret to the body member and frictionally holding the same where adjusted, an arm mounted on the turret for endwise sliding movement, and a washer on the screw having a pair of diametrically opposite depending fingers extending through holes in the turret and impinging the body member, said washer also having a radial extension between said fingers, said extension having on its outer end a depending finger extending through a hole in the turret and impinging the arm, said screw being operable on the washer to clamp the fingers onto the body member and the arm.

NEIL C. SMITH.