No. 865,597. PATENTED SEPT. 10, 1907.

W. L. E. KEUFFEL.

PROTRACTOR.

APPLICATION FILED JUNE 17, 1904.

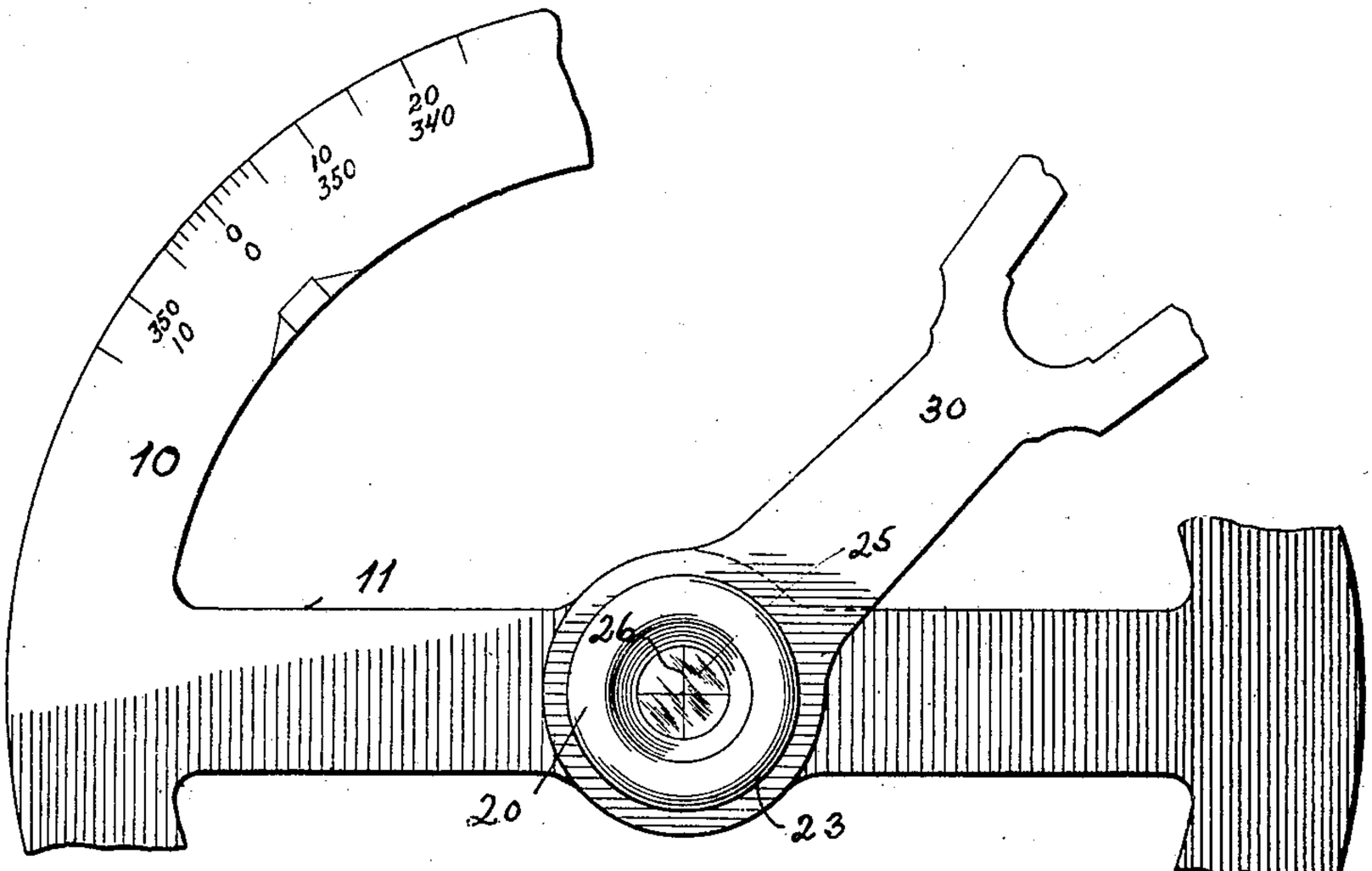

FIG. 1.

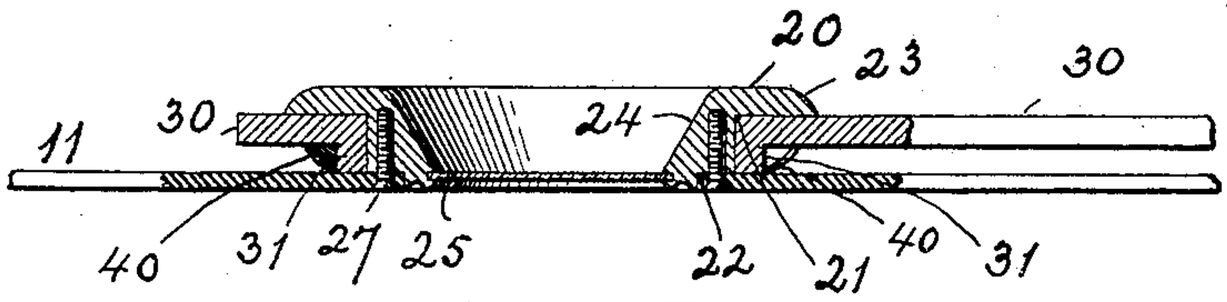

FIG. 2.

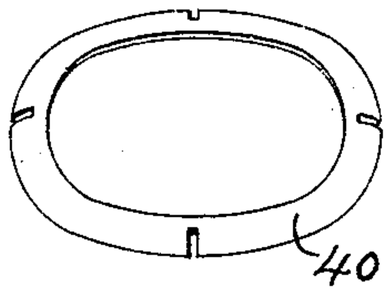

FIG. 3.

WITNESSES:

Herman Meyer

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UNITED STATES PATENT OFFICE.

WILLIE L. E. KEUFFEL, OF HOBOKEN, NEW JERSEY, ASSIGNOR TO THE KEUFFEL & ESSER COMPANY, A CORPORATION OF NEW JERSEY.

PROTRACTOR.

No. 865,597. Specification of Letters Patent. Patented Sept. 10, 1907

Application filed June 17, 1904. Serial No. 212,923.

To all whom it may concern:

Be it known that I, WILLIE L. E. KEUFFEL, a citizen of the United States, and a resident of Hoboken, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Protractors, of which the following is a specification.

My invention relates to protractors and its novelty consists in the construction and adaptation of the parts, as will be more fully hereinafter pointed out.

There are certain forms of protractors which comprise circular or semicircular arcs suitably graduated with diametric limbs supporting the protractor arm, this latter terminating inwardly in a circular bearing surrounding a hollow annular bearing which usually carries a transparent center provided with cross lines, and it is this form of protractor to which my invention relates. In these protractors the cross lines, with or without a transparent support, are not readily visible unless the draftsman's eye is almost vertically over the central bushing. This is an inconvenience and disadvantage frequently complained of by those who use this class of instruments.

The purpose of my invention is to obviate this difficulty by making the bushing of sloping sides like the frustum of a cone on its interior and by decreasing the number of parts of the instrument so that the actual thickness of such bushing shall be materially decreased, while at the same time I make a cheaper instrument, lighter in weight and which admits the light more readily.

In the drawings, Figure 1 represents a plan view of a protractor provided with my improvement; Fig. 2 is a central section of the central bushing and adjacent parts, and Fig. 3 is a perspective of the annular spring hereinafter referred to.

In the drawings, 10 is the circular portion of a protractor suitably graduated, 11 is a diametric limb provided with a central aperture to admit of the reception of a bushing, 20. This bushing has externally the form of an interrupted stepped cone, 21, comprising one step, and 22, comprising the other. It is provided on its upper surface with an edge, 23, sloping outwardly and with the internal conical depression, 24, at the bottom of which is transversely secured the transparent reticule, 25, carrying cross lines, 26, the intersection of which indicates the mathematical center of the instrument. This reticule is approximately in the plane of the lower surface, or base, of the instrument which rests upon the surface which contains the mark from which an angle is to be laid off, and the cross lines thus are sufficiently close to the plane of said mark to permit it to be positioned thereover with the required accuracy, even though the user's eye be in a position removed from the vertical plane of the bushing.

The arm, 30, is of usual form and has a central circular aperture, the periphery of which is a little thicker than the thickness of the arm by reason of a flange 31, depending from the arm around said aperture and thus giving it a wider bearing surface.

The bushing is provided with threaded holes to receive screws 27, which serve to unite it to the limb 11.

An annular spring 40, is placed between the limb 11, and the flange 31, and serves to keep the parts in their proper relative positions.

The advantage of my device is that it is composed of few parts, easy to make, and of relatively low cost, and it embodies a construction which enables the user to see the cross lines of the instrument, even if he is removed from it quite a distance laterally.

What I claim as new is:

1. An instrument of the class described, comprising a member having an apertured bushing provided with cross lines, an arm mounted to be turned around said bushing and a spring interposed between said member and arm.

2. An instrument of the class described, comprising a member having an apertured bushing provided with cross lines which are located approximately in the plane of the base of said member, said aperture adapted to disclose said cross lines from a position which is laterally removed from the bushing, an arm mounted to be turned around said bushing and a spring interposed between said member and arm.

3. An instrument of the class described, comprising a limb, a bushing provided with a central aperture having cross lines, said bushing externally having the form of an interrupted stepped cone, means for securing one step of said bushing to said limb, a rotary arm encircling said bushing and engaging the other step thereof, and a spring interposed between said limb and arm.

4. In an instrument of the class described, a limb, a bushing provided with a central conical aperture and having cross lines at the bottom thereof secured to said limb, a rotary arm encircling said bushing and a spring interposed between the limb and the arm.

5. In an instrument of the class described, a limb, a bushing provided with a central conical aperture and having cross lines at the bottom thereof secured to said limb, and provided with an overhanging flange, a rotary arm encircling said bushing and engaged by said flange and a spring interposed between the limb and the arm.

6. An instrument of the class described comprising a graduated member having a limb, a bushing applied to said limb and having an aperture and provided with cross lines arranged approximately in the plane of the lower surface of the instrument, said aperture being of gradually decreasing diameter from its top to its bottom, an arm pivotally mounted to turn around said bushing, and a spring between said limb and arm.

Witness my hand this 13th day of June, 1904, at the city of New York, in the county and State of New York.

WILLIE L. E. KEUFFEL.

Witnesses:
C. S. HAMMELL,
OTTO FREUND.