(No Model.)

F. JOHNSON.

PROTRACTOR.

No. 418,133. Patented Dec. 24, 1889.

Fig. 1.

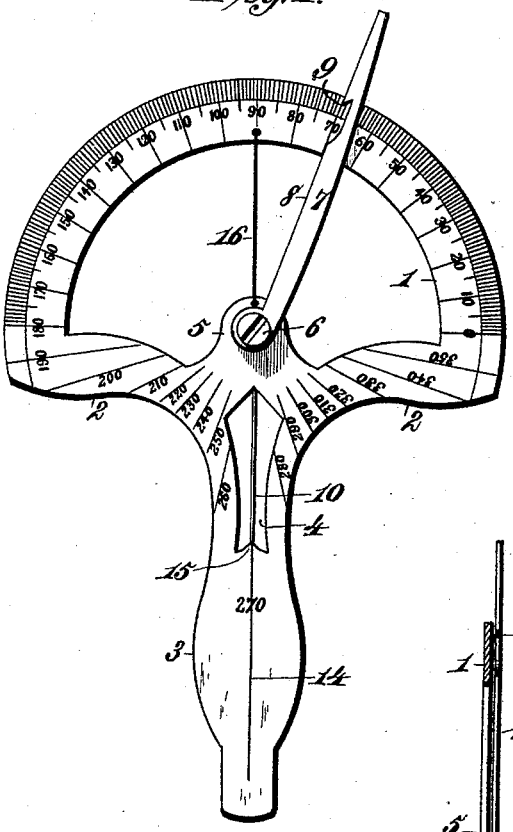


Fig. 2.

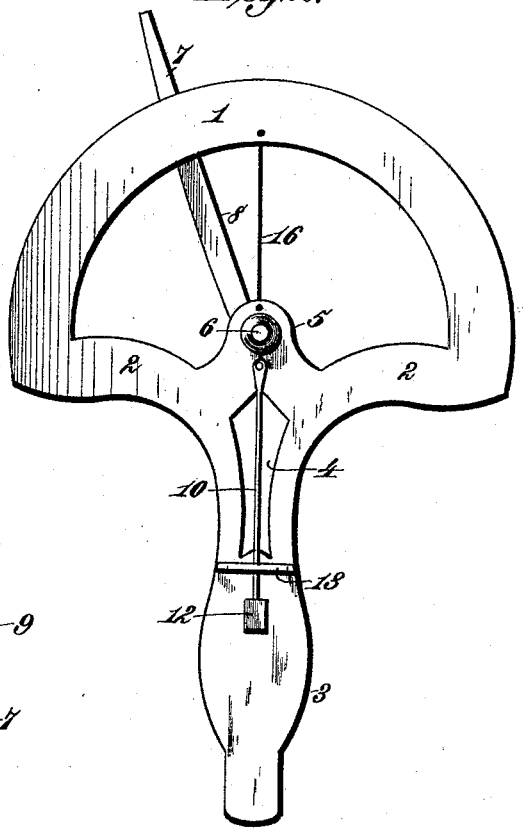
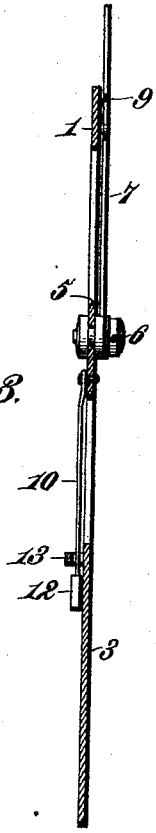


Fig. 3.



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UNITED STATES PATENT OFFICE.

FROST JOHNSON, OF NEW YORK, N. Y., ASSIGNOR OF TWO-THIRDS TO ELISHA G. SELCHOW, OF SAME PLACE, AND WILLIAM H. WALKER, OF ALBANY, NEW YORK.

PROTRACTOR.

SPECIFICATION forming part of Letters Patent No. 418,133, dated December 24, 1889.

Application filed April 11, 1889. Serial No. 306,877. (No model.)

To all whom it may concern:

Be it known that I, FROST JOHNSON, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented new and useful Improvements in Protractors, of which the following is a specification.

My invention relates to certain improvements in that class of mathematical instruments commonly known as "protractors;" and it consists of a semi-annular metallic plate graduated to show one hundred and eighty degrees.

It is the purpose of my invention to provide a novel and simple instrument of this class, whereby the graduated arc may be placed in such position that a true vertical line will pass through the central line of graduation indicating ninety degrees, and to combine with the protractor a straight edge concentrically pivoted thereon and adapted to sweep over the entire circle of graduation, whereby the operator may determine the angle of inclination of any object and reproduce or represent the same upon paper or any other material.

The invention consists in the several novel features of construction and new combinations of parts hereinafter fully set forth, and pointed out in the claims.

Referring to the accompanying drawings, Figure 1 is a plan view showing my invention. Fig. 2 is a rear elevation of the same. Fig. 3 is a detail section.

In the said drawings, the reference-numeral 1 denotes a brass protractor-plate extending over somewhat more than half of a circle and graduated in the ordinary manner. Upon the arms 2, connecting the ends of the semi-circular plate, is formed a central plate 3, which serves as a handle, said plate being formed, preferably, by curving the ends of the arms 2 downward, leaving a central longitudinal opening 4, below which the said plate extends a suitable distance. Upon a bracket 5 projecting from the arms 2 is mounted a pivot 6, which is central to the circle of graduation, and upon said pivot is mounted a straight-edge arm 7, which projects beyond the outer edge of the protractor-plate. The straight edge 8 of this arm is brought into the axial line of the pivot, and in order to aid the eye in making correct adjustments a notch is cut in said edge directly over the protractor-plate, forming a sharp point 9, which is in the line of the edge 8, and assists in setting the arm at any point in the graduated circle. Upon the rear face of the bracket 5 is pivoted a wire or bar 10, carrying on its lower end a weight 12, and forming a pendulum which will by gravity occupy a true vertical position. The swinging of the pendulum is limited by a keeper-bar 13, and its pivot-point is in a line drawn directly through the pivotal axis 6, and through the point graduated to ninety degrees on the limb 1. A line 14 is also drawn on the solid part of the plate 3, terminating in a point 15, which is in a continuation of the line passing through the pivotal axis and the point of suspension of the pendulum. A hair wire 16 may also be stretched from the pivotal axis to the central point of graduation of ninety degrees. The circle of graduation is extended over three hundred and sixty degrees by lines upon the inferior curves formed by the arms 2.

The manner of using the device is apparent. The operator holding the plate in such manner that the pendulum is free to move brings the latter to coincide with the central point 15. The arm 7 is then turned until its straight edge coincides with the outline of the object under examination, after which the angle thus ascertained may be transferred to paper, as described.

Having thus described my invention, what I claim is—

1. A protractor-plate having at its ends arms forming inferior curves, and graduated in continuance of the graduations of the plate, a plumb pivotally mounted in the central line of the protractor, and a straight-edge arm pivoted in said line and adapted to sweep the graduated surface of the plate, substantially as described.

2. A protractor-plate having arms at its ends forming inferior curves and graduated in continuance of the graduations of the plate, a plumb pivotally mounted on a bracket on the arms, and a straight-edge arm pivoted on said bracket and having its end projecting over the graduated surface, a notch formed

therein to leave a sharp point coincident with the straight edge, substantially as described.

3. A protractor having graduated arms forming inferior curves and leaving a slot or opening between them, a plumb pivoted above said opening and having its weight swinging below said opening, a straight-edge arm pivoted on a central bracket and sweeping the graduated surface, and a hair-wire stretched in a line passing through the point of ninety degrees and the pivotal axis of the arm, substantially as described.

4. A protractor-plate having a plumb pivoted in a central line and provided with a central handle having an opening through which the pendulum-bar is disclosed, substantially as described.

5. A practractor-plate having a central handle and a fixed radius, formed of a hair-wire, in combination with a plumb pivoted in a line coinciding with said radius and displayed through an opening in the central handle, substantially as described.

In testimony whereof I have affixed my signature in presence of two witnesses.

FROST JOHNSON.

Witnesses:
PERCY B. HILLS,
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