(No Model.)

A. J. SHAW.

PROTRACTOR.

No. 367,673. Patented Aug. 2, 1887.

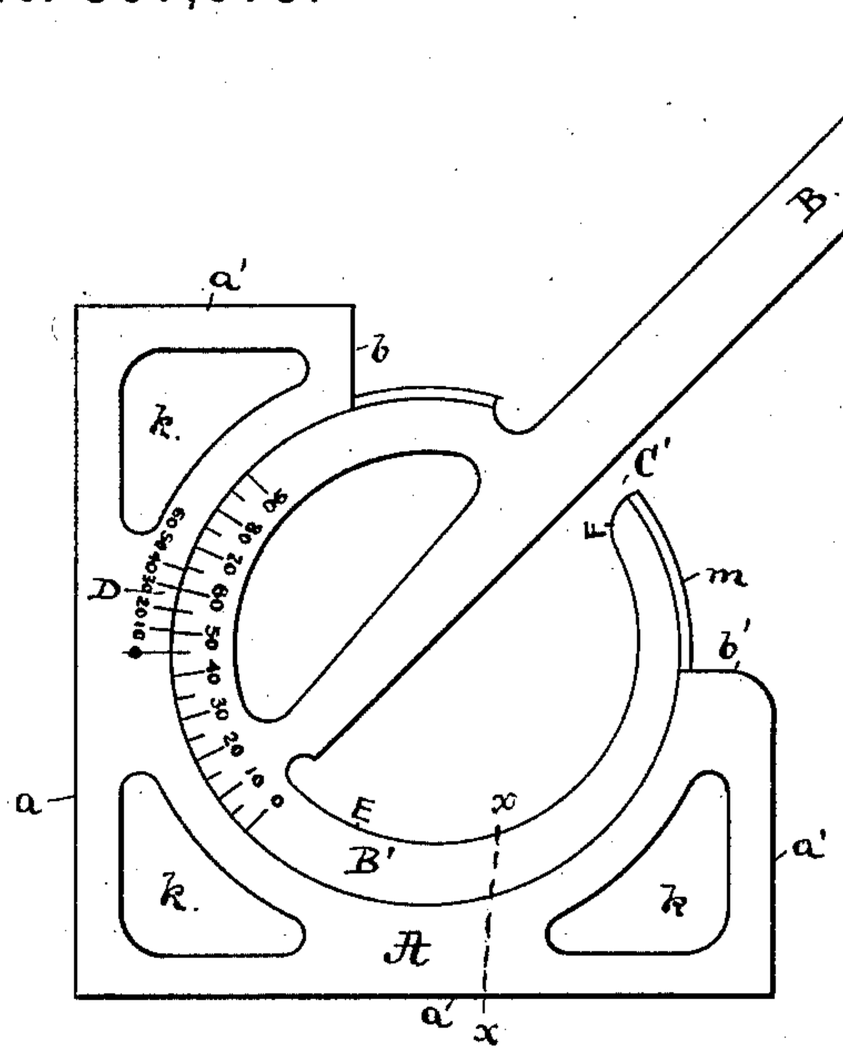

Fig. 1.

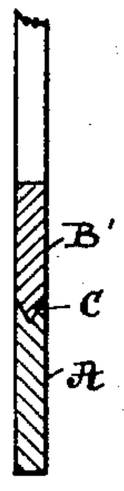

Fig. 2.

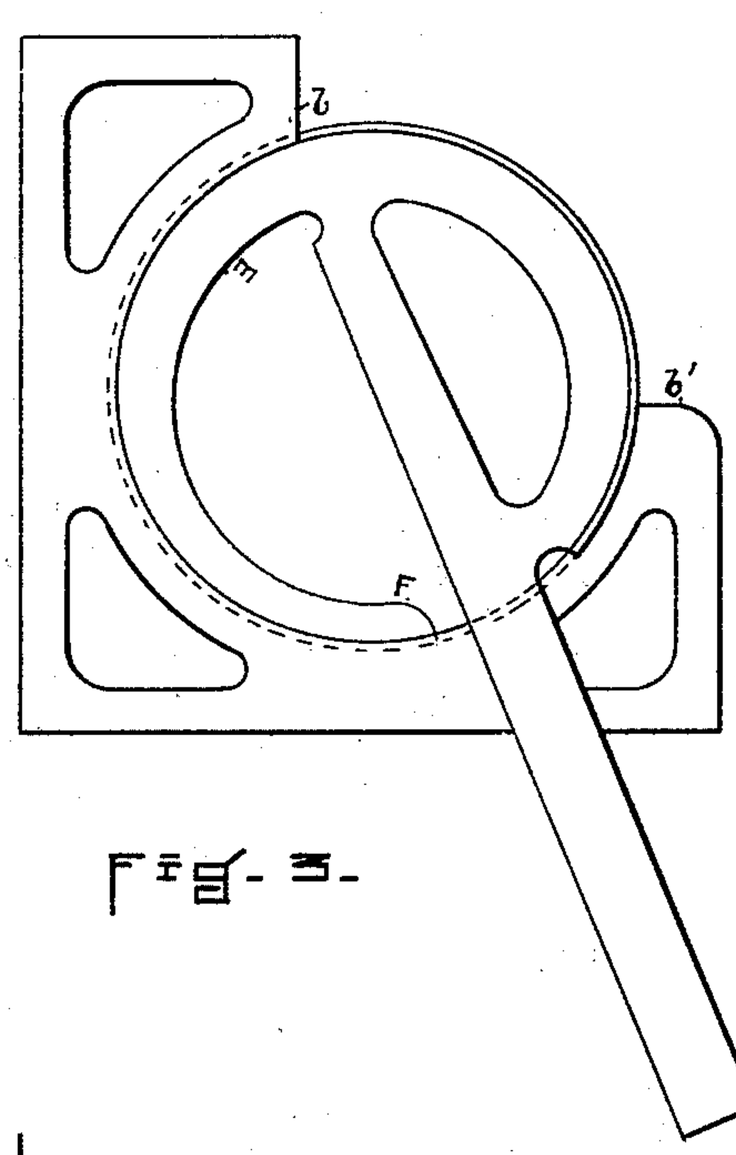

Fig. 3.

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ALTON J. SHAW, OF PROVIDENCE, RHODE ISLAND.

PROTRACTOR.

SPECIFICATION forming part of Letters Patent No. 367,673, dated August 2, 1887.

Application filed February 21, 1887. Serial No. 228,422. (No model.)

To all whom it may concern:

Be it known that I, ALTON J. SHAW, of Providence, Rhode Island, have invented a new and useful Protractor, of which the following is a specification.

The object of this invention is to produce a reversible protractor, more particularly adapted to the use of draftsmen, that can be adjusted to any angle required, with which lines can be drawn at right angles with each other without resetting the blade, and that shall embrace in its structure great convenience, simplicity, accuracy, and durability; and it consists in making a protractor in two principal parts, of sheet metal or other suitable material, so arranged that the surfaces of both parts shall be in the same plane or flush with each other; and, also, in continuing the working-edge of the blade inwardly beyond the center of its circular part or arc, thus increasing the available working-length of said edge.

In the accompanying drawings, Figure 1 represents a face view of the protractor; Fig. 2, a cross-section through line *x x;* Fig. 3, the first position of the parts when being put together.

In the drawings, the letter A represents the frame or head, the two edges of which, *a a*, form a right angle, and are used in the process of drawing against the T-square blade, straight-edge, or on a line. The shorter edges, *a' a'*, need not necessarily be at right angles with the edges *a a;* but in some cases it would be convenient to have them so.

B represents the blade, made in the same piece with or firmly attached to the circular part B', which has a bearing, *m*, of a V or other suitable shape, cut away at C' for the passage of a pencil, and so that it may be inserted in the groove C of frame A, ninety degress of this circular part being graduated, which graduation may be used with a vernier, D, on the frame A. The frame or head has a central circular opening, the perimeter C of which is formed to fit the bearing of the blade, and which may be cut away at *b b'* sufficiently for the blade to move a quarter of a circle, more or less, and leave room for the passage of the pencil between the blade and frame. The elasticity of the part of B' from E to F holds the blade sufficiently firm for ordinary use, and by stretching the inner edge between E and F, by hammering or some other method of doing such work, the piece can be tightened to any degree required. The openings *k k k* are to lessen the weight.

To put the two parts together, place them as shown in Fig. 3, hold the part E F in the groove C, and move the blade toward and into the opening *b b'*. For convenience, when the zero-marks on the graduated scales are together the back edge of the blade may rest against the shoulder of the frame A at *b'*.

The frame A, blade B, and the circular part or arc B' are all of the same thickness, or nearly so, and thus when placed together their opposite sides will be practically in the same plane, so that the protractor will rest firmly upon the paper with either face downward, thereby securing exactness in the lines drawn along the edge of the blade, and, both sides of the instrument being alike, the graduations of the arc may be made upon either side of the same, or upon both sides, as desired. It is also very desirable in instruments of this class to extend the working-edge of the swinging blade as near as possible to the edge of the square against which the frame is held; and, as heretofore constructed, the available edge portion of the swinging blade has not been continued inwardly beyond the center of the circular part or arc by means of which the blade is held in the frame; but by my improvement the central portion of the frame is cut away, so thus the working-edge of the swinging blade can be continued. The segment included between E and F has a desirable elasticity, as hereinbefore described, while the opposite segment of the arc is of rigid construction, thus preventing the working-edge of the blade from being bent out of true line with the graduations of the arc.

Having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A protractor having in combination a frame provided with a circular opening having a holding-groove in the edge of the frame bounding said opening, and a swinging blade extending outward from a circular part or arc fitting the circular opening and groove of the frame, whereby the plane surface of the said

circular portion or arc will be fully exposed at both sides of the instrument, substantially as described.

2. A protractor having in combination a frame provided with a circular opening having a holding-groove in the edge of the frame bounding said opening, and a swinging blade provided with a circular part or arc fitting the circular opening and groove of the frame, the blade having its available working-edge extended inward beyond the center of the said circular part or arc, substantially as described.

3. A protractor having in combination a frame provided with a circular opening, with a holding-groove in the edge of the frame bounding said opening, and a swinging blade extending outward from a circular part or arc which has a rigid and a flexible segment held in the groove of the frame, substantially as described.

4. A protractor having in combination a frame provided with a circular opening, with a holding-groove in the edge of the frame bounding said opening, and a swinging blade extending outward from a circular point or arc which has a rigid and a flexible segment held in the groove of the frame, the said blade having a working-edge which is continued inwardly beyond the center of said circular part or arc, substantially as and for the purpose specified.

5. A protractor having in combination a frame provided with a circular opening, with a holding-groove in the edge of the frame bounding said opening, and a swinging blade extending outward from a circular part or arc which has a rigid and a flexible segment held in the groove of the frame, so that the plane surface of the said circular part or arc will extend flush with the frame at both sides of the instrument.

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Witnesses:
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