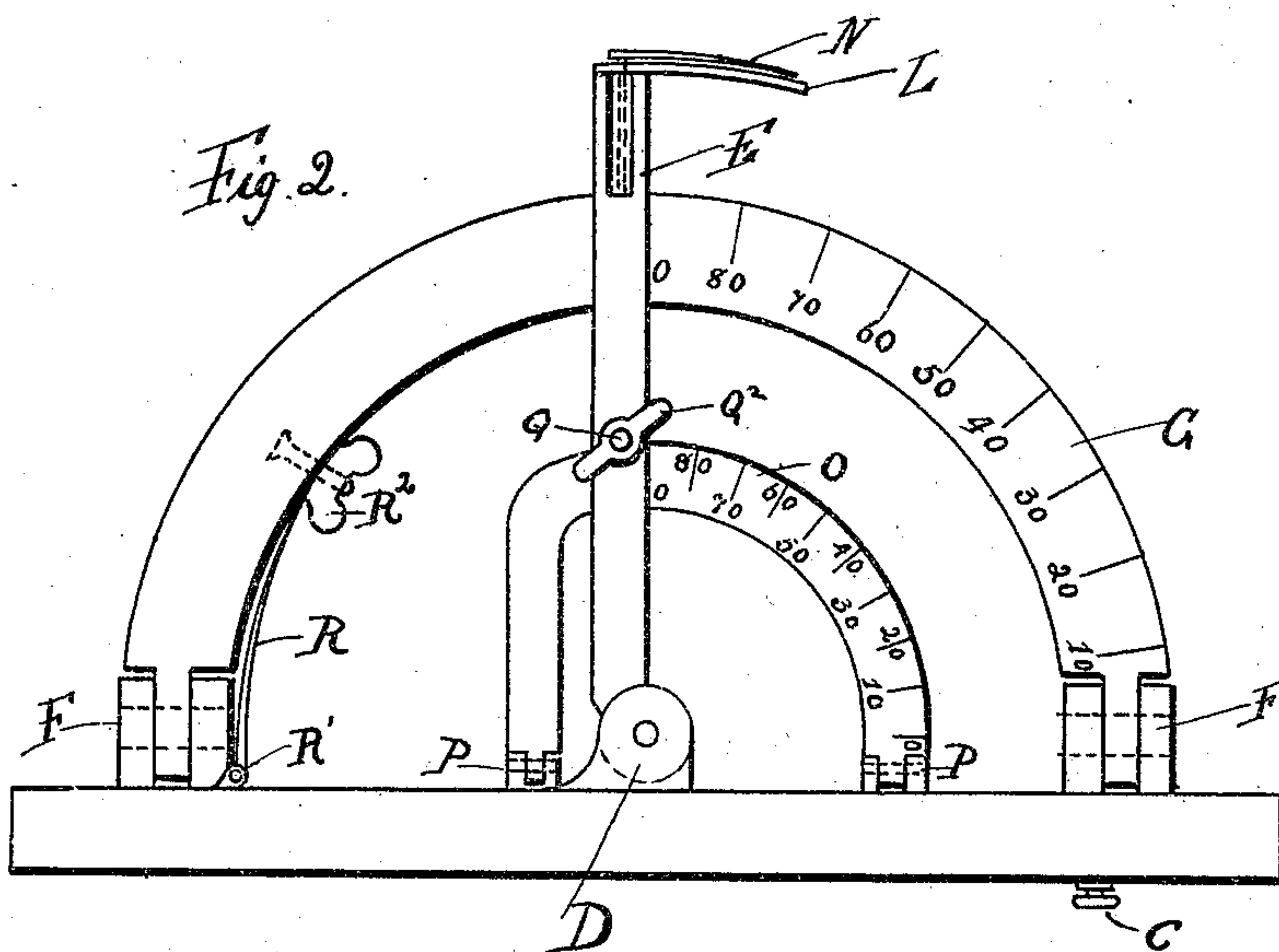
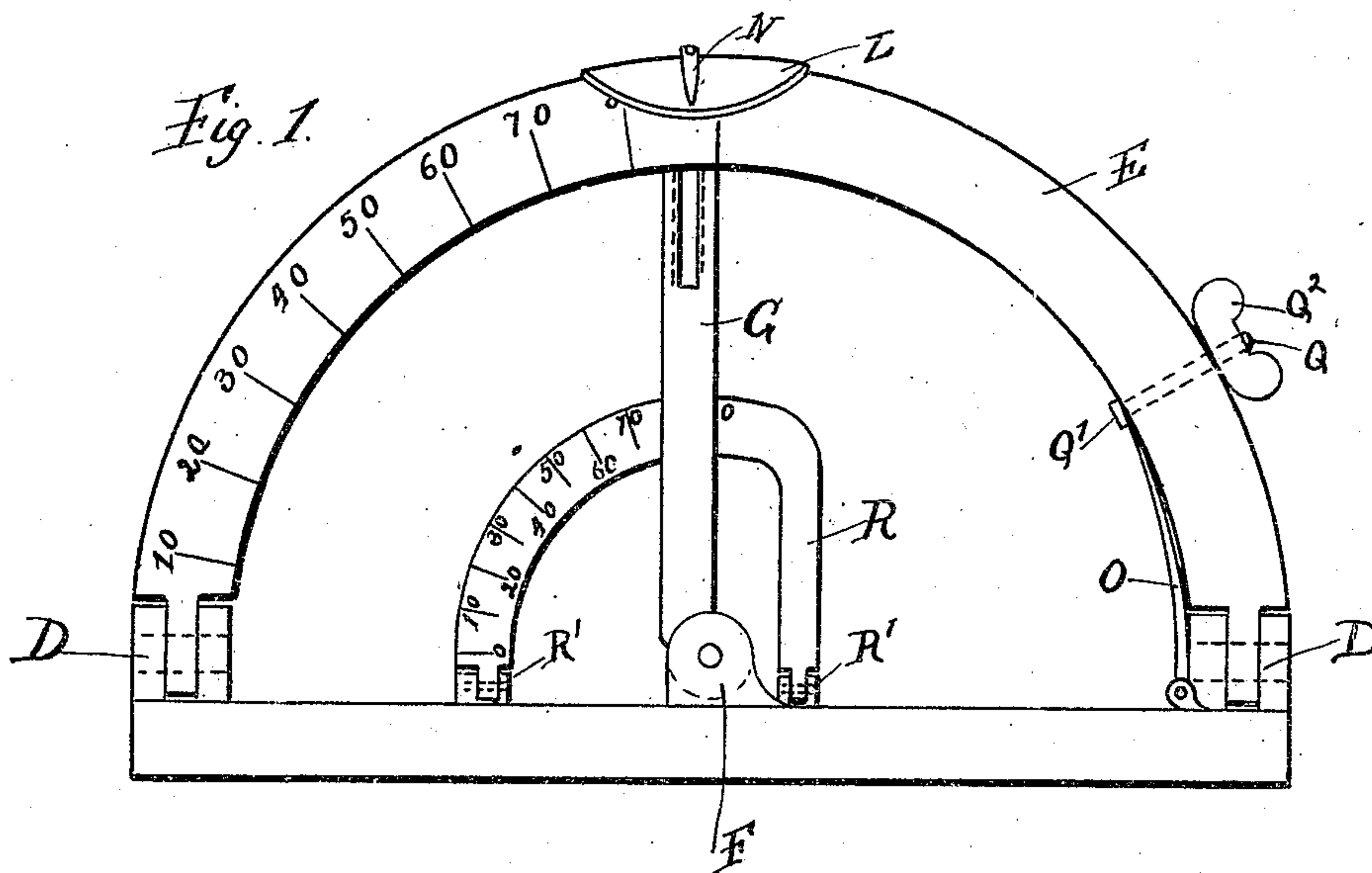


No. 842,584.

PATENTED JAN. 29, 1907.

J. M. RIDLEY.  
ANGLE FINDER.  
APPLICATION FILED APR. 23, 1906.

2 SHEETS—SHEET 1.



WITNESS:  
*Francis A. Pocock.*  
*S. Williamson*

INVENTOR  
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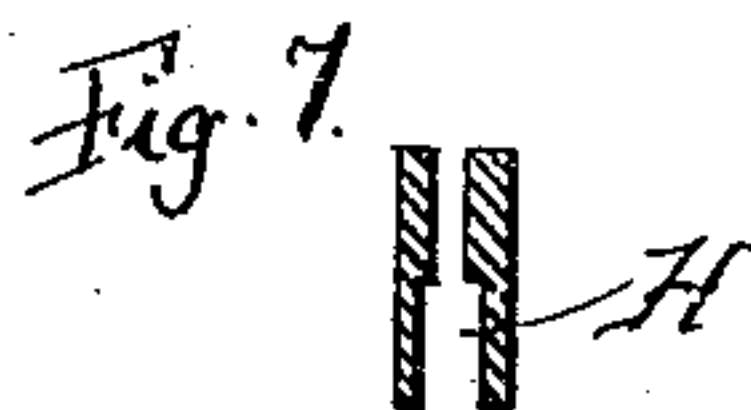
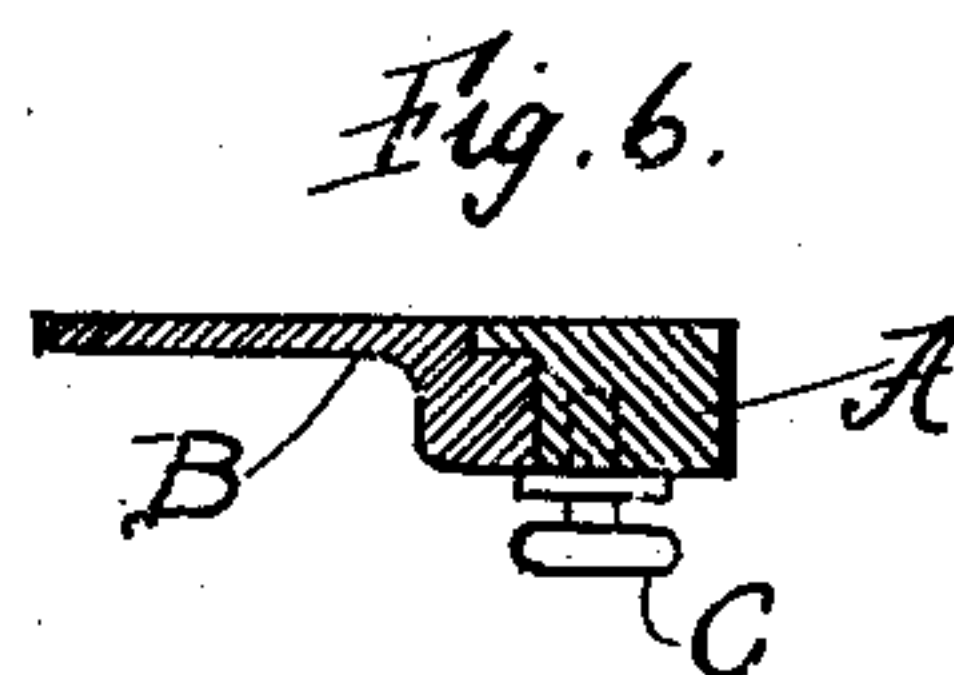
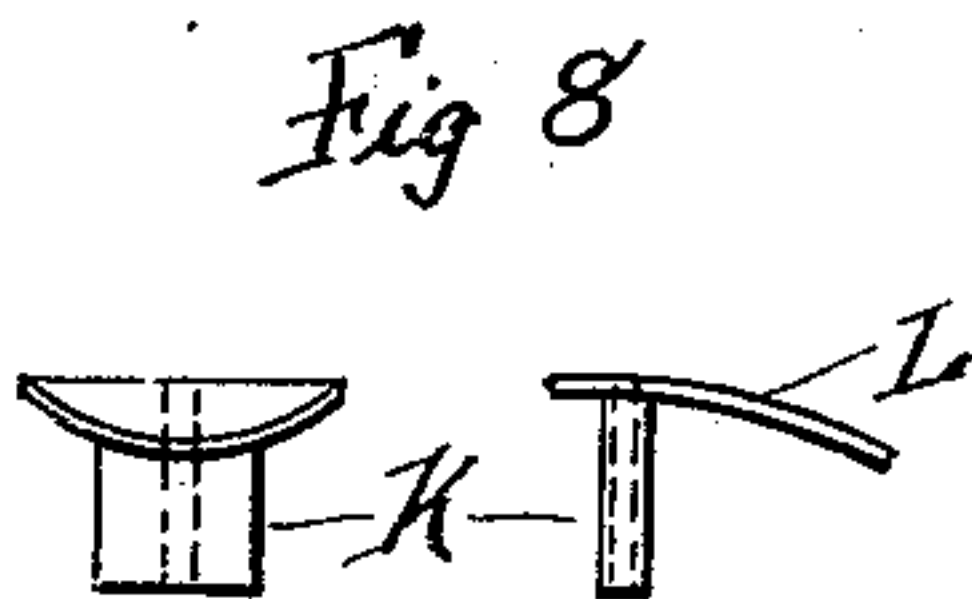
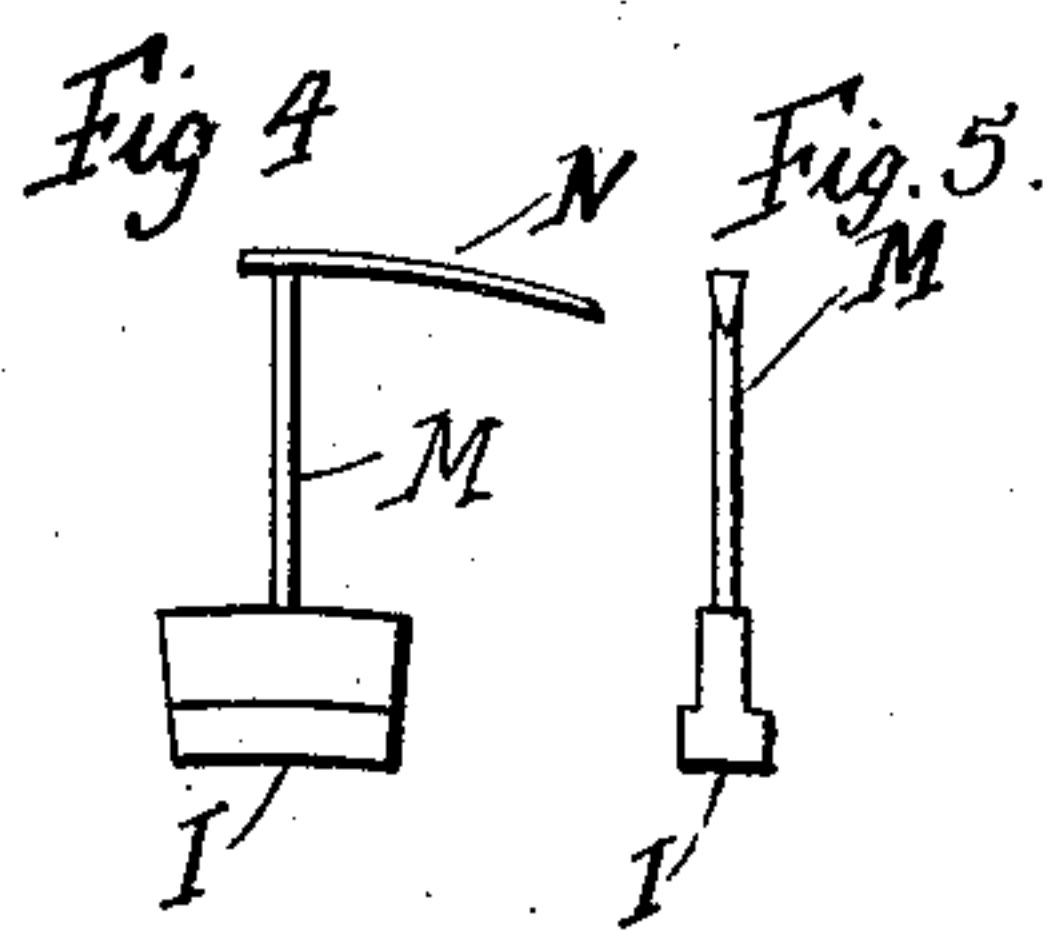
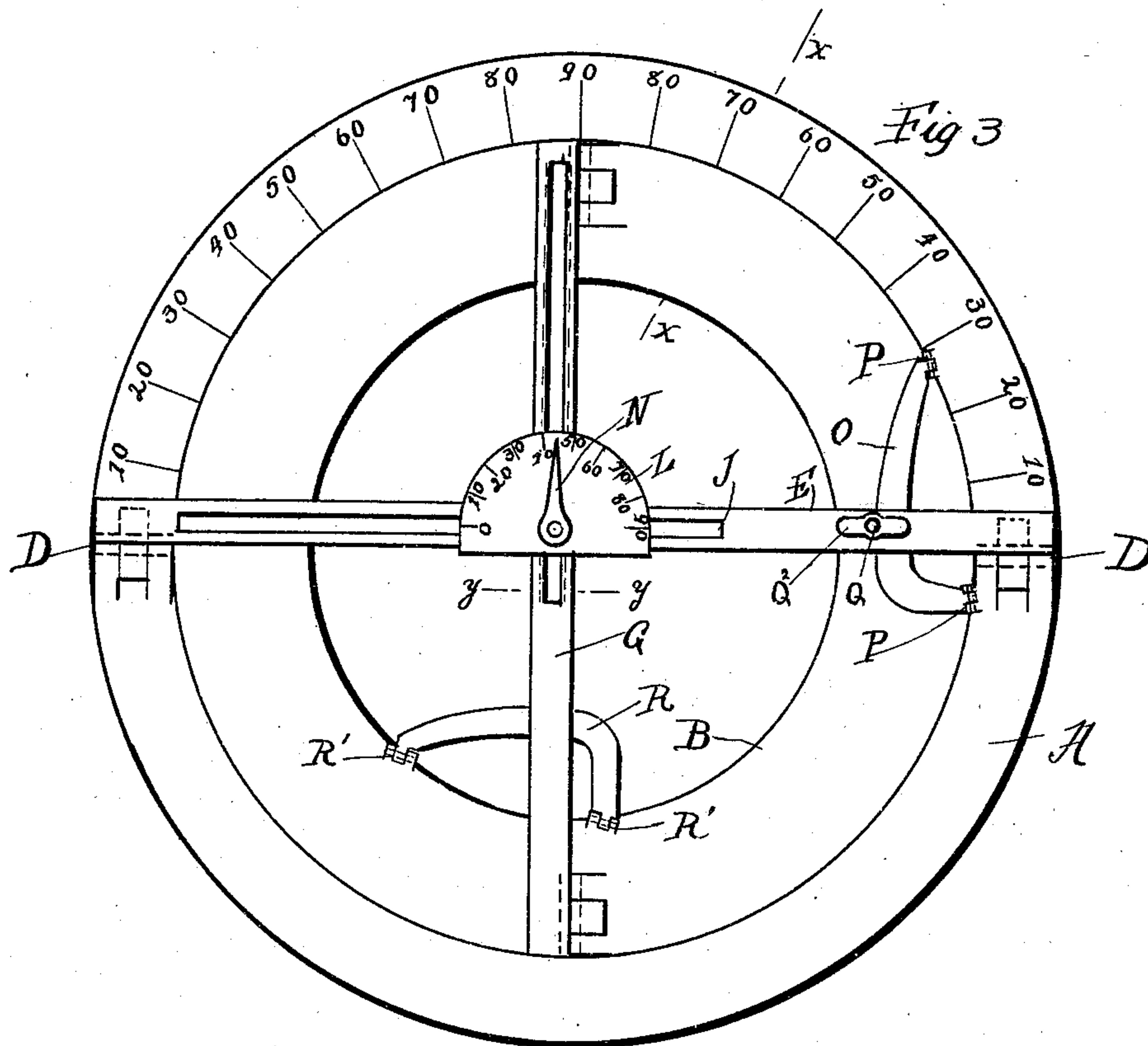
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WITNESS:  
*Francis A. Pocock.*  
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ATTORNEY



# UNITED STATES PATENT OFFICE.

JAMES M. RIDLEY, OF CAMDEN, NEW JERSEY.

## ANGLE-FINDER.

No. 842,584.

Specification of Letters Patent.

Patented Jan. 29, 1907.

Application filed April 23, 1906. Serial No. 313,139.

*To all whom it may concern:*

Be it known that I, JAMES M. RIDLEY, a citizen of the United States, residing at Camden, county of Camden, and State of New Jersey, have invented a certain new and useful Improvement in Angle-Finders, of which the following is a specification.

My invention relates to a new and useful improvement in angle-finders, its object being to determine the angles of the miter and bevel of any two meeting surfaces when the angle of the meeting lines is known and the angle of the slant is known and also to determine a great variety of secondary angles when two primary angles are given.

With these ends in view this invention consists in the details of construction and combination of elements hereinafter set forth and then specifically designated by the claims.

In order that those skilled in the art to which this invention appertains may understand how to make and use the same, I will describe its construction in detail, referring by letter to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is an elevation of my improvement, showing the adjustable protractors set at ninety degrees; Fig. 2, a similar view taken at right angles to Fig. 1; Fig. 3, a plan view; Fig. 4, a detail view of the miter-indicator; Fig. 5, a view at right angles to Fig. 4; Fig. 6, a section at  $xx$  of Fig. 3, showing the screw for holding the adjustable base-ring in any adjustment; Fig. 7, a section at the line  $yy$  of Fig. 3, showing the T-shaped groove in which the shoe of the bevel-indicator travels; Fig. 8, reduced detail views of the miter-dial.

In carrying out my invention as here embodied I provide a circular base A, in which is fitted the adjustable ring B, so as to swing concentric with the base and be held in any adjustment by means of the thumb-screw C, as will be readily understood. The base has hinged thereto at D the quadrant E, while the ring has hinged thereto at F the quadrant D, and the last-named quadrant has formed therein the T-shaped groove H, in which the shoe I is fitted to slide, this shoe also being T-shaped to correspond with the groove to prevent its withdrawal when the two quadrants are parallel with each other. The quadrant E has formed therein the slot J, and in this slot is fitted the block K, so as to slide therein, the upper end of the block having formed therewith the dial L. This dial is a half-circle, but is divided by gradu-

ation into ninety lines. The shoe I has projecting therefrom the small rod M, which passes through the block I, and has secured to its upper end the pointer N. By this arrangement when the quadrants are set at any angle to each other other than ninety degrees the swinging of these quadrants upon their hinges will cause the pointer N to swing relative to the dial L, thus indicating the miter of the meeting surfaces of two pieces of wood or other material which are to be matched together, or the adjustment of the protractor G by the turning of the ring B will also cause the pointer to move relative to the dial.

In order that the protractor E may be held in any adjustment produced by being swung on its hinges and also in order that when so adjusted the angle to which it is adjusted may be determined, I provide a gage O in the form of a quadrant, which I prefer to hinge to the base, as indicated at P, so that when the instrument is closed or folded this gage may also be folded. The screw Q is passed through the quadrant E, the head Q' thereof being arranged to engage the curved edge of the gage, while the thumb-nut Q<sup>2</sup> is threaded upon the outer end of the screw by means of which the head Q' may be drawn tightly against the gage, and thus serve to lock the quadrant in any adjustment. The gage O is graduated from "0" to "90," so that the quadrant E may be adjusted to any desired angle, as will be readily understood. The quadrant G is also provided with a gage R, which is hinged at R', so as to be folded when the instrument is not in use, and the thumb-nut R<sup>2</sup> serves to lock the quadrant to this gage in any desired adjustment, said gage being graduated from "0" to "90" to determine the adjustment of the quadrant.

Each of the quadrants has marked thereon graduations from "0" to "90", and as these graduations cross each other these graduations determine the angle of the bevel to be cut. The base is also graduated from "0" to "90" in two directions, so that in its adjustment any angle within this range may be determined.

In one of the ordinary uses to which my improvement may be put—namely, that of determining the miter and bevel of the meeting ends of two pieces of material, such as in wood-working and the like, the angle at which the two pieces are to stand relative to each other being known—the ring is adjusted so that the quadrant G carried thereby is



brought in alinement with this known angle, as shown by the graduations on the base. Next, the angle at which each of the two pieces is to stand to the horizontal being known, each of the quadrants is adjusted to correspond to the particular angle at which each of the pieces is to stand, which adjustment is determined by the gage of the particular quadrant and the quadrants are locked, as before described. Now it is only necessary to read the graduations on the quadrants which coincide with their crossings, which will be the angles of the miter to be cut for both the meeting edges of the piece and for the horizontal surfaces. The graduations at which the pointer end stands on the dial L will be the miter at which the meeting ends of the two pieces must be cut. To perfectly match this, it will be seen that without mathematical calculations the miter and bevel of any meeting edges may be quickly and accurately ascertained from the known angles and which the pieces meet, and in practice it is considered next to impossible to calculate the miter and bevel in complicated work, and the method generally used is to cut and try, which is both a waste of time and material and seldom produces accurate results.

Any bevel and miter can be found by degrees as soon as the two meeting angles are known.

When the instrument is not in use, the quadrants may be folded down upon the base and ring and the gage swung inward upon the ring, thereby permitting the packing of the instrument in exceedingly small space.

While there is a great variety of uses to which my improvement may be put, I do not deem it necessary to go into a detail description of all of the uses, as the principle involved in the determining of a miter and bevel from two known angles is the same principle which underlies various other calculations, all of which may be quickly and accurately obtained by this device without the necessity of lengthy and complicated mathematical calculations.

Having thus fully described my invention, what I claim as new and useful is—

1. As a new article of manufacture, an instrument for determining two angles from two known angles consisting of two horizontal concentric rings adjustable relative to each other, a quadrant carried by each of the

rings, said quadrants crossing each other and means for determining the angles at which the quadrants are adjusted, as specified.

2. In an angle-determining instrument, a graduated base, a ring fitted thereto adapted to be adjusted concentric therewith, a quadrant hinged to the base, a quadrant hinged to the ring, said quadrants crossing each other and being graduated, gages by which the quadrants may be adjusted and the angle of their adjustment determined, a block fitted to travel in one quadrant, a graduated dial carried by the block, a pointer pivoted at the center of the graduations of the dial and a shoe fitted to travel in the other quadrant and connected with the pointer so as to cause the latter to move over the face of the dial when the quadrants are moved relative to each other, as and for the purpose set forth.

3. In combination with an instrument of the character described, two hinged quadrants crossing each other, a dial adapted to slide upon one of the quadrants, a pointer adapted to travel over the face of the dial and means carried by the other quadrant for causing the pointer to move when the quadrants are adjusted relative to each other, as specified.

4. In an instrument of the character described, a circular base, the graduated quadrant E hinged to said base, the graduated gage O also hinged to the base, means for holding the quadrant in any adjustment relative to the gage, a ring fitted within the base and adapted to be adjusted concentrically with said base, a quadrant G hinged to said ring, a gage R also hinged to the ring, means for adjusting the last-named quadrant relative to its gage, a graduated dial, a block projecting therefrom adapted to run in a groove in the quadrant E, a pointer, a rod to which said pointer is secured, said rod passing through said block and a shoe adapted to travel in a slot formed in the quadrant G, said shoe being attached to or formed with the rod carrying the pointer, as specified.

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

JAMES M. RIDLEY.

Witnesses:

FRANCIS A. POCOCK,  
E. N. SCHOFIELD.