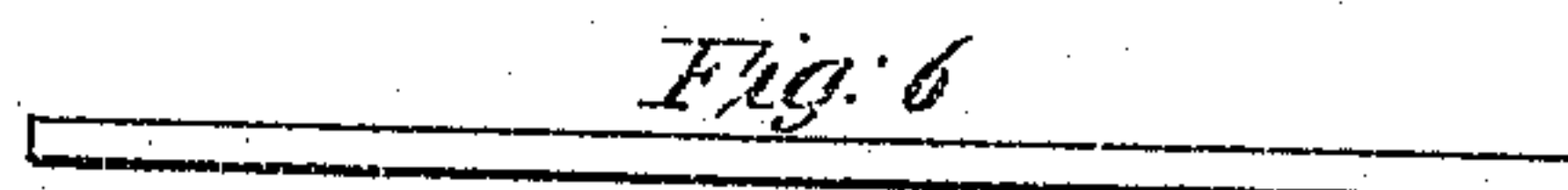
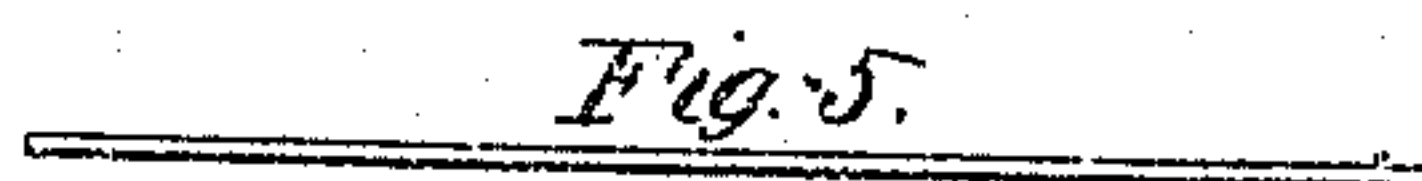
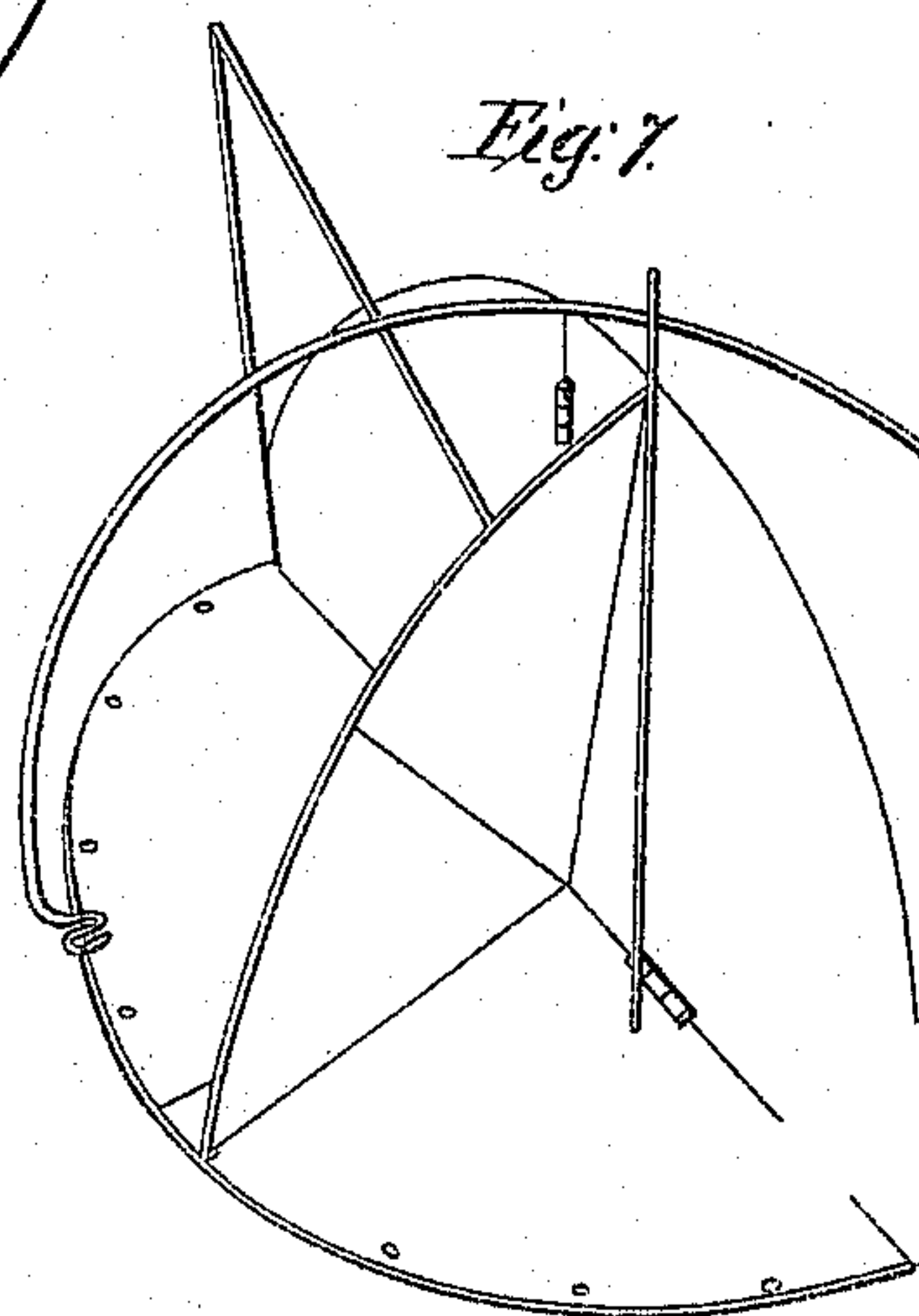
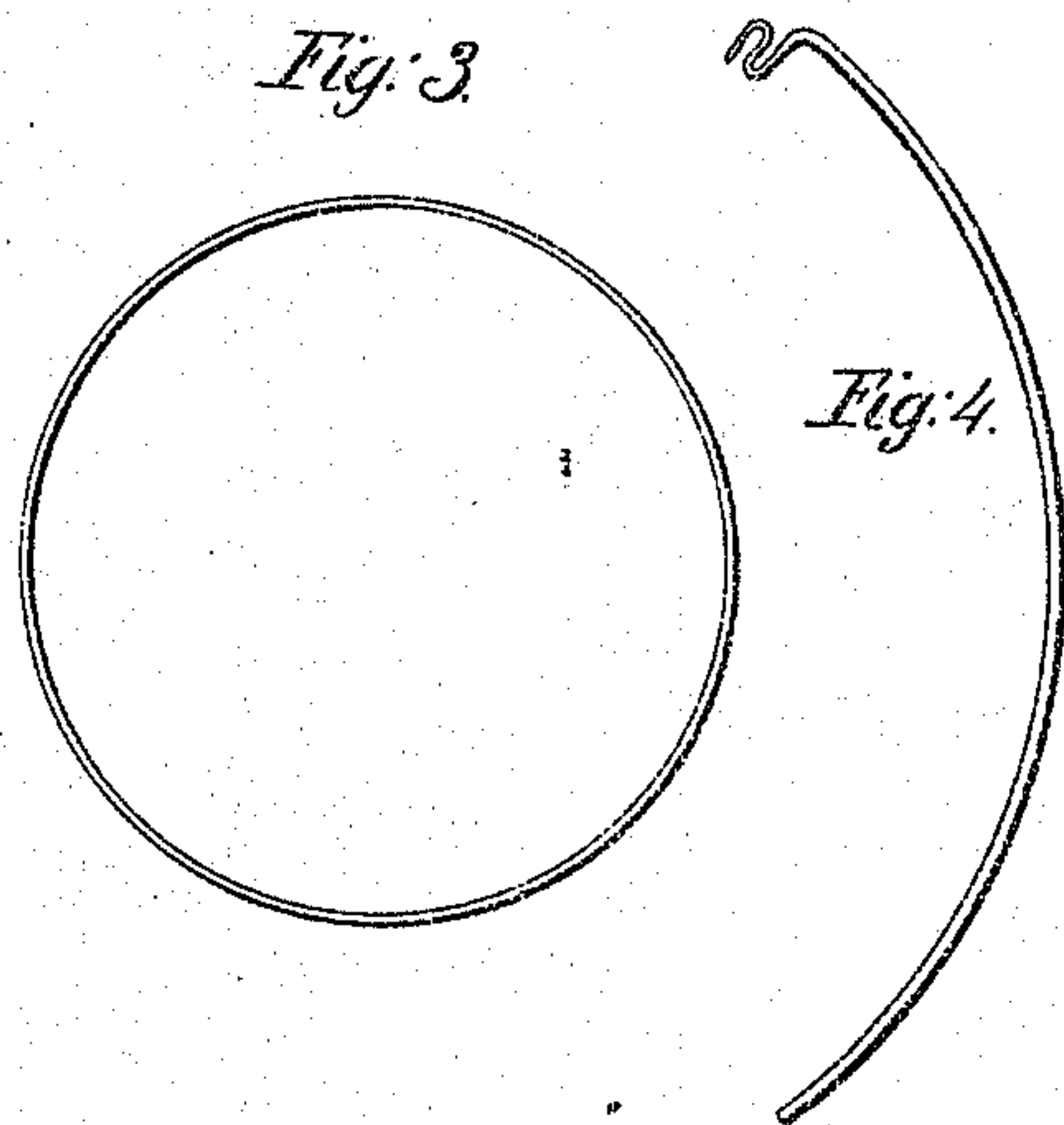
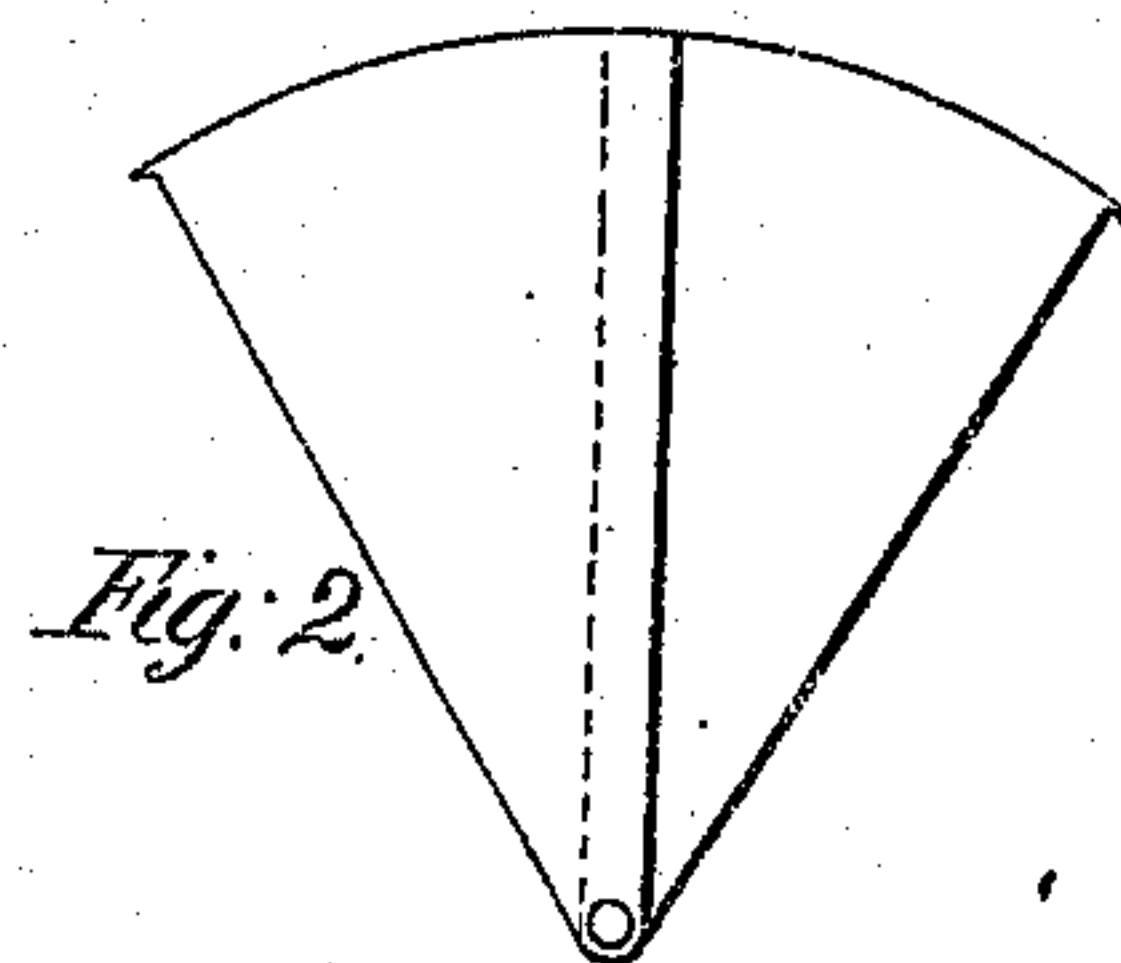
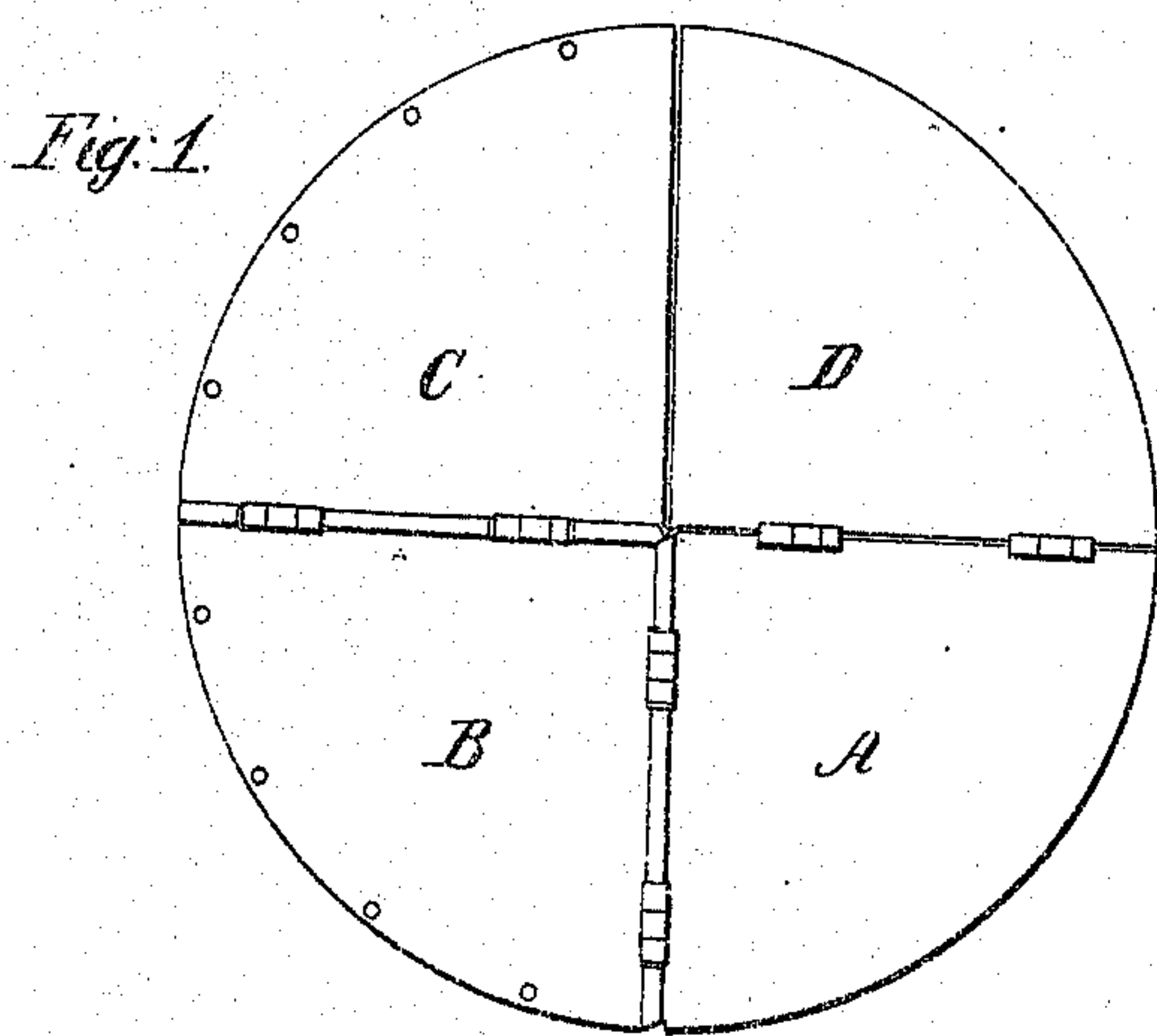


*S. N. Manning*  
*Illustrating Spherical Trigonometry.*  
*N<sup>o</sup> 83392.* *Patented Oct. 27, 1868.*



*Witnesses;*  
*W. F. Becker*  
*James A. Carr*

*Inventor;*  
*Stephen C. Manning.*



# United States Patent Office.

STEPHEN N. MANNING, OF KANKAKEE, ILLINOIS.

*Letters Patent No. 83,392, dated October 27, 1868.*

## APPARATUS FOR ILLUSTRATING SPHERICAL TRIGONOMETRY.

The Schedule referred to in these Letters Patent and making part of the same.

### *To all whom it may concern:*

Be it known that I, STEPHEN N. MANNING, of the city of Kankakee, in the county of Kankakee, and State of Illinois, have invented a new and useful Apparatus for Illustrating the Science of Spheric Geometry and Trigonometry, called a Spheric Delineator; and I do hereby declare that the following is a full, clear, and exact description of the construction and use of the same, reference being had to the accompanying drawings, and letters and figures marked thereon, which form a part of this specification.

In said drawings—

Figure 1 represent a plane, black, circular surface, made of sheet-iron or any convenient material, divided into quadrants.

Figure 2 represents a sector made of the same material, consisting of two smaller sectors, joined at the acute angles by a pivot, so as to open and close, to represent larger or smaller arcs, and having points at the outer end of the arcs to enter the holes in the quadrants to keep it in place.

Figure 3 represents a metallic ring.

Figure 4 represents the divisor, being a wire bent in form of an arc, and having a hook or clamp at one end with which to attach it to an arc.

Figure 5 represents a straight wire, called a perpendicular.

Figure 6 represents a tangent or secant-bar, being a straight bar of wood or metal. Two bars of the same kind are used.

Figure 7 is a perspective view of one of the many positions in which my apparatus may be placed in order to represent different cases of spheric triangles, showing each part except the small circle or metallic ring.

The nature of my invention consists in an apparatus to be used to illustrate the science of spheric geometry and trigonometry, by adjusting the different parts and applying the several sections so as to form and show distinctly the points, lines, arcs, and angles of spheric triangles in their true relative positions and proportions.

To enable those skilled in the science to understand how to construct and use my invention, I will proceed to describe the same with particularity.

I construct a plane, black, circular surface, of sheet-iron or any convenient material, and divide the same

into quadrants, as represented in fig. 1 by the letters A, B, C, and D; quadrants B and C having several small holes in the arcs. I hinge the quadrants A to B, B to C, and D to A.

To construct any quadrantal triangle, place quadrants B and C at any angle with each other, and at right angles to the quadrants A and D.

To construct any other triangle, place two quadrants at any required angle with each other, and place the sector between them to form the third side. On the planes of the quadrants and sector, any required lines can be drawn.

To represent a small circle, place any three of the quadrants perpendicular to the fourth, and place on the top the metallic ring.

To divide a triangle, or represent any required arc, attach the divisor to any arc, and extend it across another arc.

To represent a perpendicular, extend the perpendicular from a vertical angle to the opposite plane.

To represent a tangent or secant, attach the tangent-bar to any arc by means of any small clamp.

To construct fig. 7, let quadrants A and D lie horizontal; elevate quadrants B and C to an angle of about seventy degrees; place the sector between quadrants C and D; from the vertical intersection of quadrant C and the sector, extend the perpendicular at right angles to the plane of quadrant D; attach the divisor to the arc of quadrant A, and let it cut the arc of quadrant B; attach tangent-bar to quadrant B, to form a tangent, and a similar bar, (there being two such used,) to quadrant B, to form a secant.

What I claim as my invention, and desire to secure by Letter Patent, is—

The combination and arrangement of the hinged-sector, plates, and wires, constructed substantially as described, for the purpose of illustrating and demonstrating the problems of spherical geometry and trigonometry, by forming the diagrams so as to show all the parts in their true relative positions and proportions.

STEPHEN N. MANNING.

Witnesses:

W. S. DECKER,  
JAMES N. ORR.