

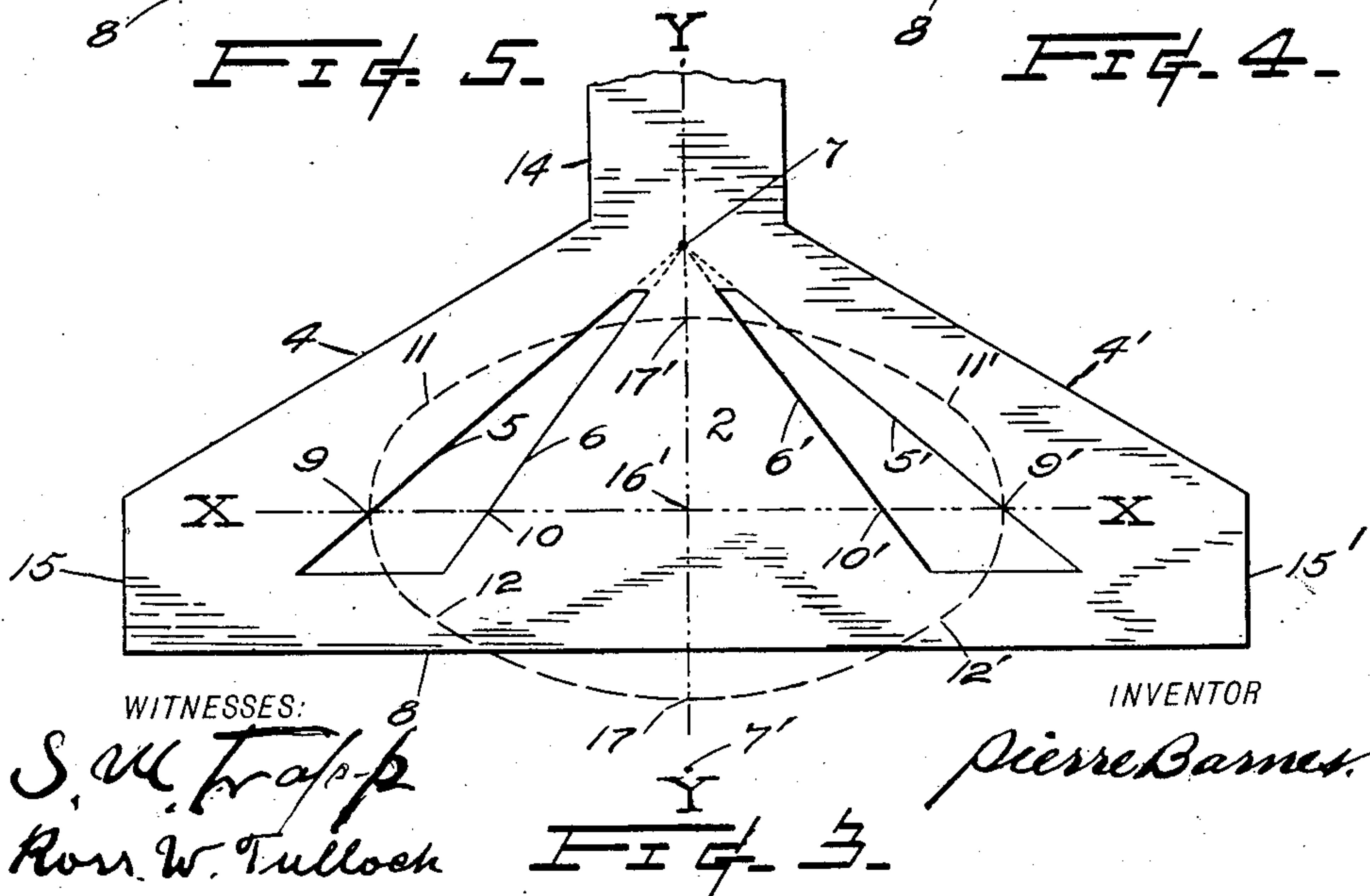
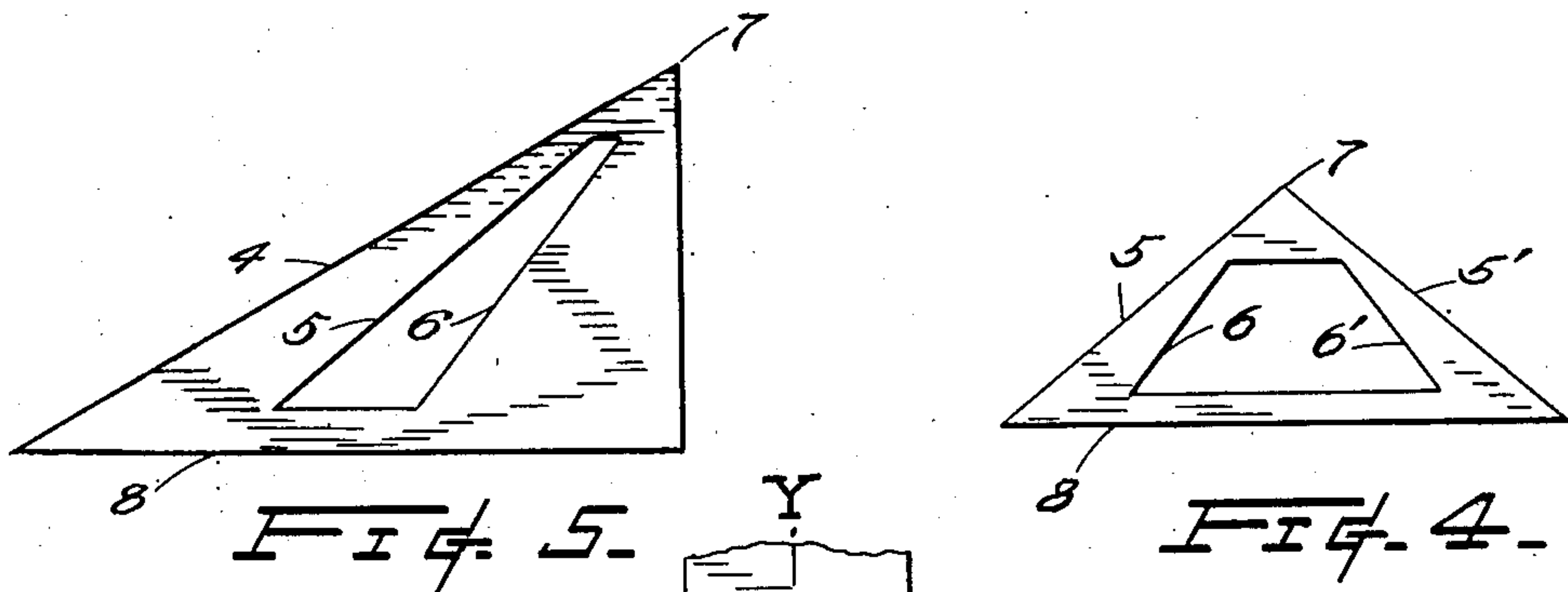
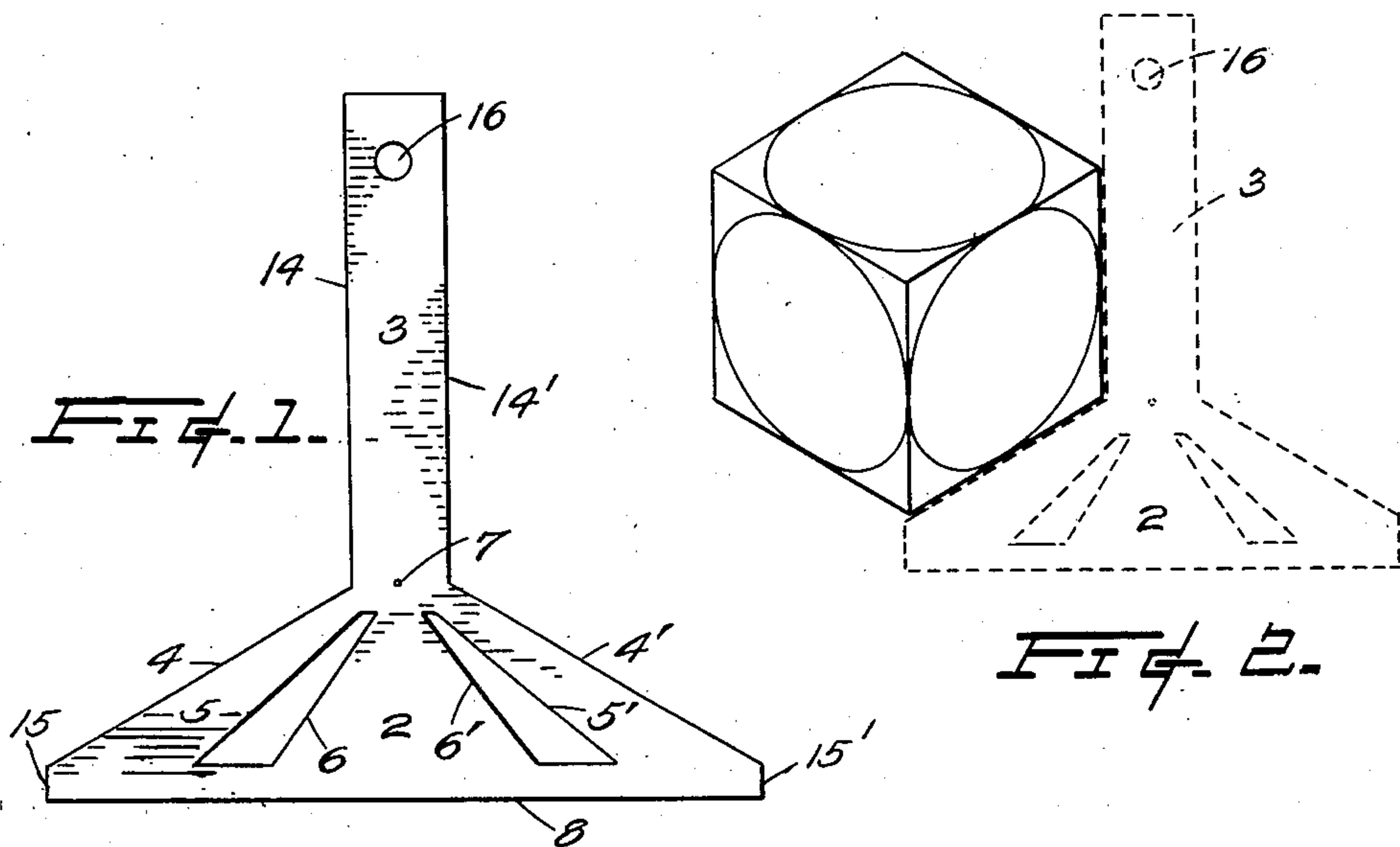
No. 777,770.

PATENTED DEC. 20, 1904.

P. BARNES.
ISOMETRIC DRAFTING INSTRUMENT.

APPLICATION FILED FEB. 2, 1904.

NO MODEL.



UNITED STATES PATENT OFFICE.

PIERRE BARNES, OF SEATTLE, WASHINGTON.

ISOMETRIC DRAFTING INSTRUMENT.

SPECIFICATION forming part of Letters Patent No. 777,770, dated December 20, 1904.

Application filed February 2, 1904. Serial No. 191,848.

To all whom it may concern:

Be it known that I, PIERRE BARNES, a citizen of the United States, residing at Seattle, in the county of King and State of Washington, have invented certain new and useful Improvements in Isometric Drafting Instruments, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to improvements in instruments for drawing isometric projection; and its object is to provide an instrument whereby not only the straight isometric lines may be readily drawn, but more especially the curves which are elliptical by finding the centers of arcs of circles which will coincide with the curve of a given ellipse.

The invention is of simple and inexpensive construction and requires no adjustment of parts, as is usual in the devices known as "ellipsographs." It may be easily and quickly manipulated, so as to enable a person with but little skill or knowledge of mechanical drawing to lay out a great variety of elliptical curves.

The invention consists in the novel construction and combination of parts in a drafting device, as will hereinafter be fully described, and illustrated in the accompanying drawings, wherein—

Figure 1 shows an instrument embodying my invention provided with a blade projecting at right angles to the triangle-base for drawing the straight isometric lines and the interiorly-disposed edges for locating the centers whereby the arcs are struck of the elliptical curves. Fig. 2 shows the device in broken lines as applied to straight-line isometric drawing. Fig. 3 shows the manner of using the device in making the elliptical curves. Figs. 4 and 5 are modifications showing simply the invention for drawing elliptical curves.

The flat and triangular-shaped body indicated in Fig. 1 of the drawings is made of either celluloid, paper, hard rubber, metal, or other material suitable for drafting-triangles and is provided with an enlarged section 2, which may be bounded by a base or horizontal edge 8, vertical edges 15 15', and inclined edges 4 4', preferably thirty degrees

(30°) to the horizontal edge 8, and a rectangular blade 3, having the two vertical edges 14 14', which are at right angles to the base 8 and intersecting at one hundred and twenty degrees, (120°,) preferably, the inclined edges 4 4'. In the upper end of blade 3 is an opening 16, by which it may be suspended when not in use, as customary with ordinary T-squares.

The outline of the preferred form of the device, as shown in Figs. 1 and 2, is that of the outline of an inverted funnel; but it is to be distinctly understood that this particular shape is not essential to the invention, as any other form could be adopted. The form shown, however, has been found to be well adapted for the purposes intended in combining the edges for drawing the straight lines and the means for locating the centers for describing elliptical arcs, making a compact arrangement and utilizing little material in manufacture.

In the section 2 is a triangular opening having the edges 5 and 6 inclined toward each other to such an extent that a continuation of them will intersect at a point 7 within the device. An opening is provided at this point 7 sufficiently large to permit a needle or pencil point to pass through and mark on the surface of the drawing material placed under the triangle the point of intersection. The inclined edge 5 is the locus of one of the ends of all transverse or major diameters, and the edge 6 is the locus of the different foci corresponding to the different transverse diameters. The second set of edges 5' and 6' of a similar triangular opening are so located and arranged as to intersect at the same point 7 and symmetrically placed with respect to a vertical line Y Y passing through said point 7. Thus it will be seen if a horizontal line is drawn through the device, as indicated by line X X in Fig. 3, cutting the lines representing the edges 5 5' and 6 6' and the line Y Y, the point of intersection at 16' will be the focal center of an ellipse whose transverse diameter is represented by the length of line 9 9', and line 10 10' is the distance between the foci and equal in the construction shown to the conjugate diameter 17 17'. Now in order to draw a given ellipse, having given the

extremities of the transverse diameter, slide the triangle until the lines or edges 5 5' agree or register with the ends of the said diameter. This will establish the corresponding position of the foci 10 10' by the intersection of the diameter with the edges 6 6', respectively, and the points from which the arcs must be struck to form the curves 12 9 11 or 12' 9' 11' having as a radius the line 9 10 or 9' 10'. The intersection of the continuation of edges 5 and 6 or 5' and 6' at point 7 will give the point from which the arc 12 17 12' can be drawn with a radius equal to 7 12 or 7 17. To complete the ellipse, a point 7' is found by continuing the conjugate diameter on line Y Y and making the distance 16' 7' equal to 16' 7, striking an arc from point 7' with a radius equal to 7 17, and describe the curve 11 17' 11'. When the conjugate diameter—as, for example, 17 17', Fig. 3—on line Y Y only is given, and being in the present construction the same as the focal length 10 10' or distance between the foci, one slides the triangle, with the edge 8 parallel to the conjugate diameter, until the extremities 17 17' are coincident with the edges 6 6' and mark off on the continuation of the line Y Y points corresponding to the intersection of the edges 5 5', which will be the length of the transverse diameter and must be marked off on a line at right angles to the line Y Y, with its center corresponding with the focal center 16'. The foci for the several arcs can now be quickly determined, as above pointed out. Thus it will be seen from the foregoing that ellipses of varying transverse and conjugate diameters can be quickly drawn when either of the diameters is given and only four centers for describing the arcs comprising the elliptical curve are required.

It is not essential that four inclined edges 5 5' 6 6' be provided. Either pair of them—that is to say, 5 and 6 or 5' and 6'—will furnish sufficient data to construct an ellipse; but the two pairs of edges are preferably used together in order to more quickly locate the other center and extremity without reversing the instrument, as will be readily understood from an inspection of Figs. 3 and 5. It is also desired to be understood that many changes may be made in the aforescribed embodiment of the invention without departing from its scope of usefulness or sacrificing its advantages, as will be readily suggested to one skilled in the use of the instrument.

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

1. An instrument for drafting consisting of a flat body bounded by edges making approximately one hundred and twenty degrees and provided interiorly with two pairs of fixed op-

positely and symmetrically inclined straight edges whose lines of extension intersect at a common point, substantially as described.

2. An instrument for drafting, consisting of a flat one-piece body of material having two equal and similar trapezoidal openings the non-parallel edges of which are symmetrically arranged and inclined with respect to a line passing between them, and all of the inclined edges having a common fixed point of intersection within the device, substantially as described.

3. A drafting device for isometric projections consisting of a flat body having vertical edges, an enlarged section bounded by edges making one hundred and twenty degrees with said vertical edges, said enlarged section having interiorly arranged two pairs of oppositely inclined and symmetrically-disposed edges whose lines of extension intersect within the body of the device, substantially as described.

4. A drafting device for isometric projections, consisting of a flat body, having vertical edges, an enlarged section bounded by edges making one hundred and twenty degrees with the said vertical edges, said enlarged section having interiorly-arranged triangular openings the edges of which are symmetrically arranged and inclined with respect to a line passing between them and having a common point of intersection within the device, substantially as described.

5. A drafting device for isometric projections consisting of a flat body having vertical blade 3 having straight edges 14, 14', an enlarged section 2 having base edge 8 and inclined edges 4, 4', making one hundred and twenty degrees with said edges 14, 14', the section 2 having interiorly-arranged triangles having sides 5, 5' and 6, 6' and a common point of intersection 7, substantially as described.

6. In a drafting device for drawing elliptical curves, the inclined edge 5 coinciding with the locus of one of the outer extremities of the major axes, the inclined edge 6 coinciding with the locus of the centers for striking arcs through corresponding points in the first-named locus, said inclined edges when extended intersecting the continuation of the minor axes and locating the common center for striking arcs which will be respectively tangent to the first-named arcs and pass through an extremity of the respective minor axes, substantially as described.

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

PIERRE BARNES.

Witnesses:

HENRY S. NOON,
D. C. HAY.