F. M. DANNENFELSER.

DEMONSTRATING APPARATUS.

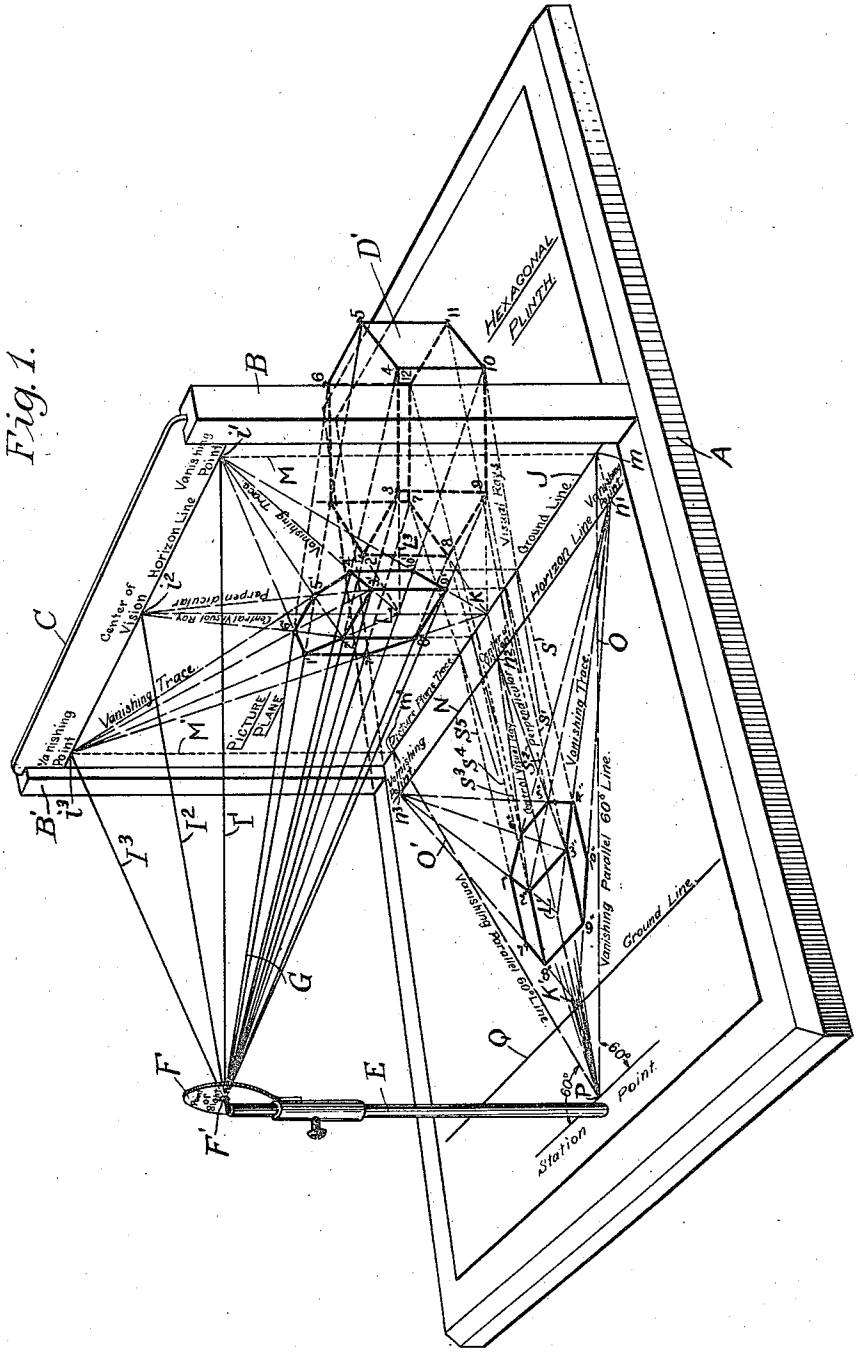
APPLICATION FILED OCT. 24, 1913

1,210,608.

Patented Jan. 2, 1917.

5 SHEETS—SHEET 1.

Fig. 1.



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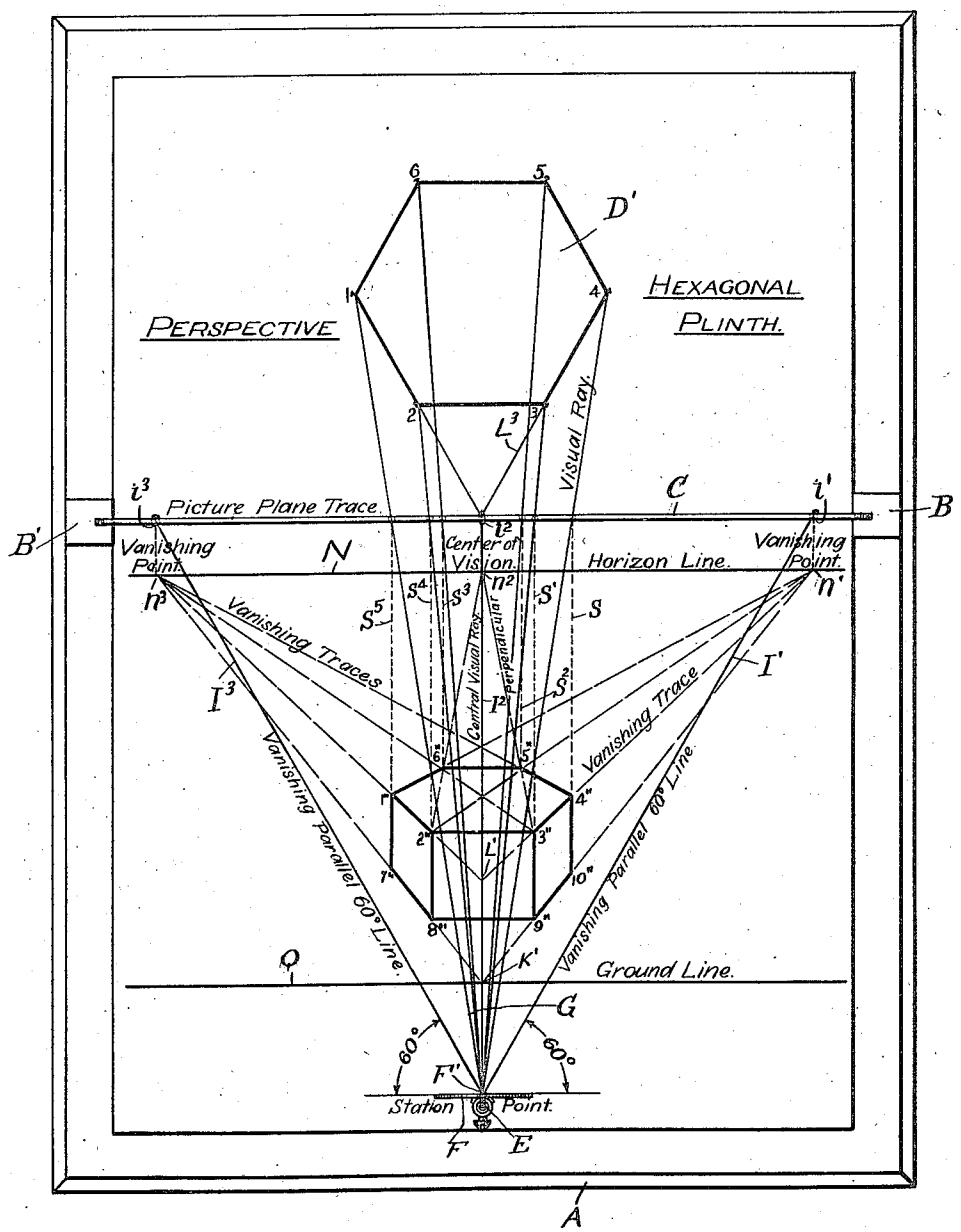
APPLICATION FILED OCT. 24, 1913.

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Patented Jan. 2, 1917.

5 SHEETS—SHEET 2.

Fig. 2.



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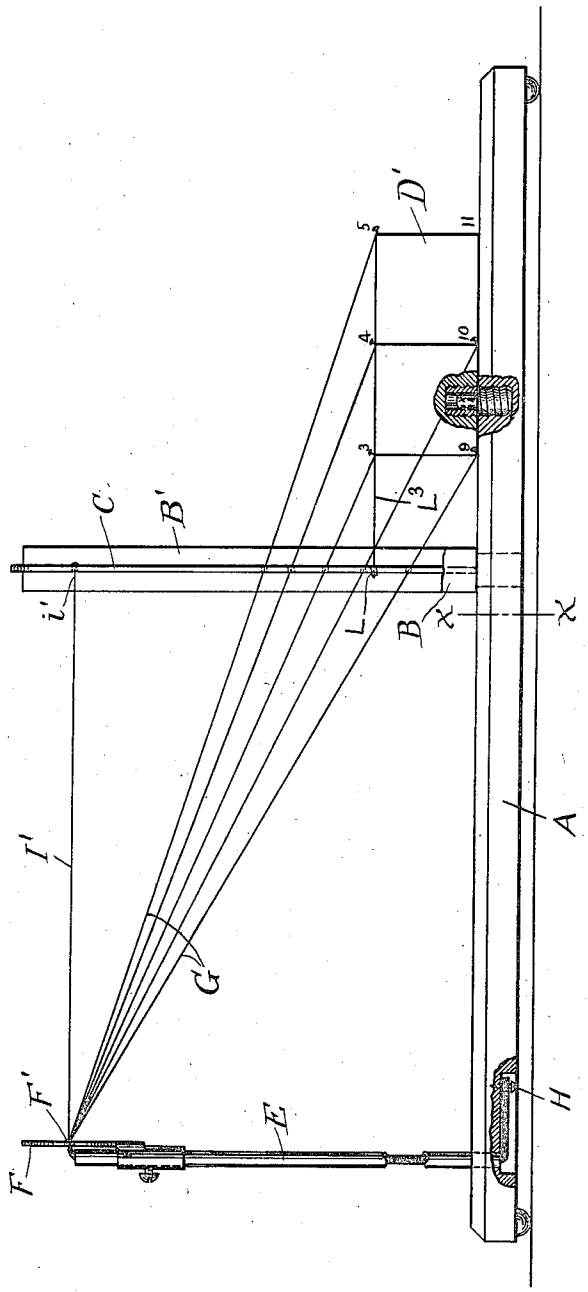
APPLICATION FILED OCT. 24, 1913.

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5 SHEETS—SHEET 3.

Fig. 3.



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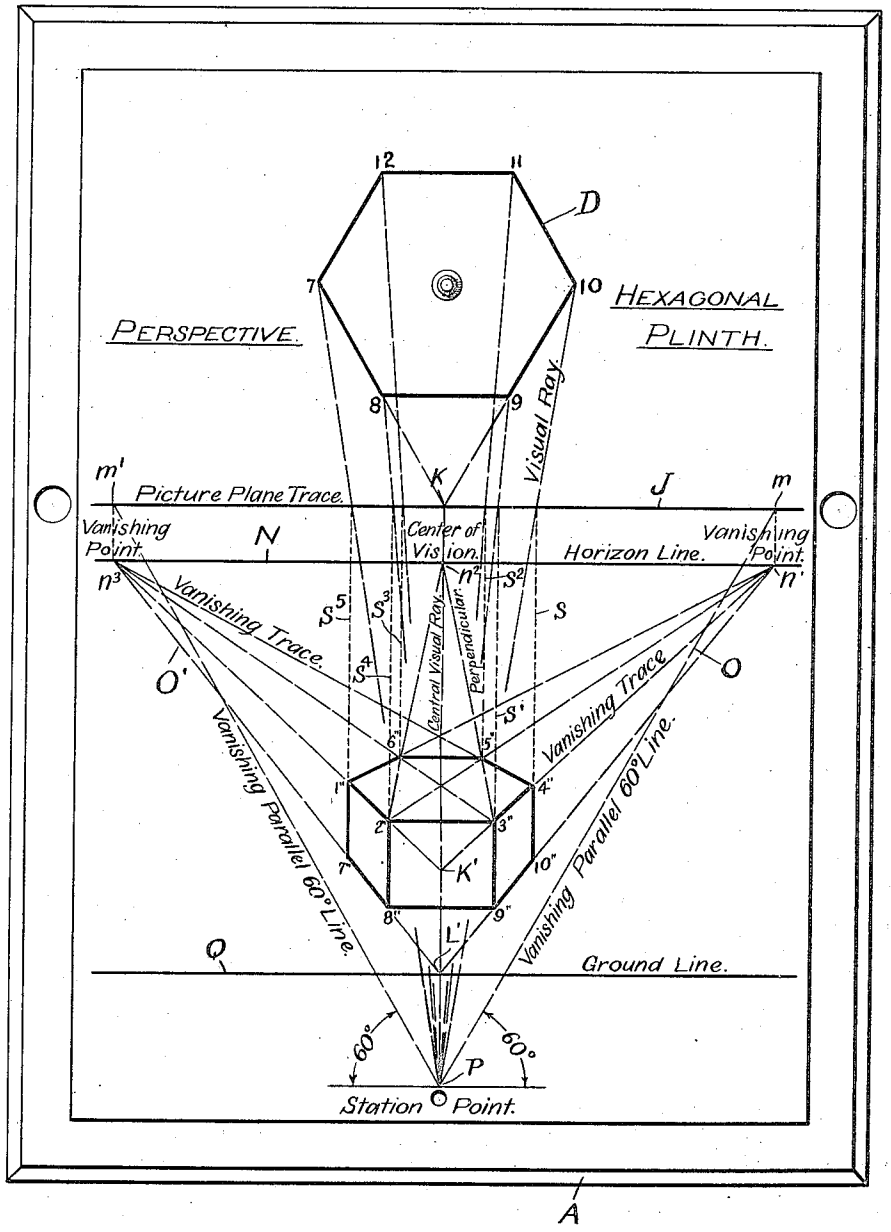
APPLICATION FILED OCT. 24, 1913.

1,210,608.

Patented Jan. 2, 1917.

5 SHEETS—SHEET 4.

Fig. 4.



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DEMONSTRATING APPARATUS.

APPLICATION FILED OCT. 24, 1913.

1,210,608.

Patented Jan. 2, 1917.

5 SHEETS—SHEET 5.

Fig. 5.

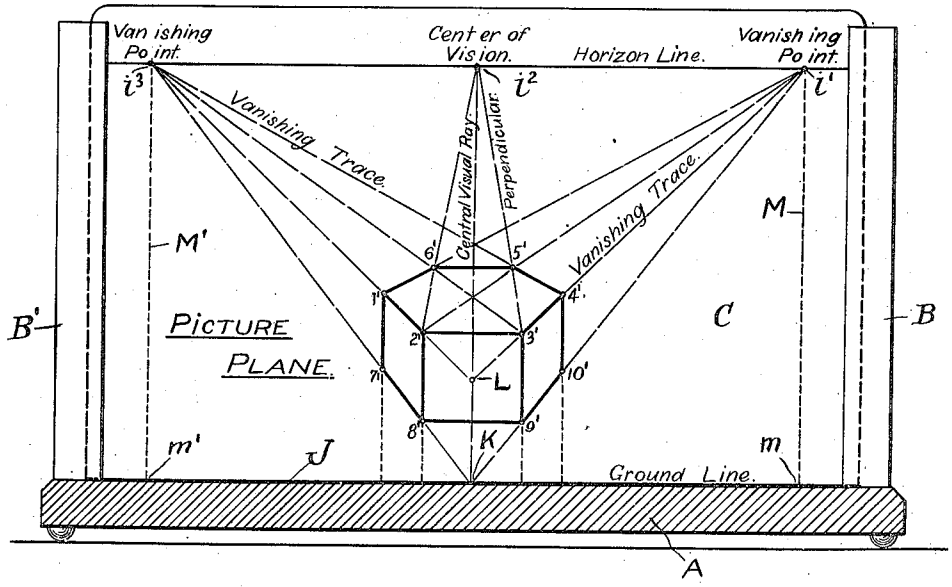
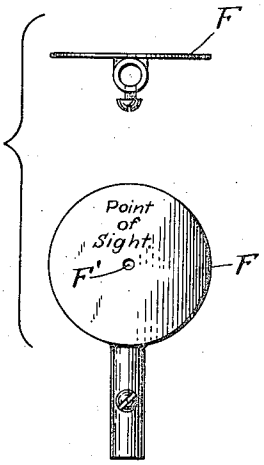


Fig. 6.



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UNITED STATES PATENT OFFICE.

FREDERICK M. DANNENFELSER, OF MUSKEGON, MICHIGAN.

DEMONSTRATING APPARATUS.

1,210,608. Specification of Letters Patent. Patented Jan. 2, 1917.

Application filed October 24, 1913. Serial No. 797,016.

To all whom it may concern:

Be it known that I, FREDERICK M. DANNENFELSER, a citizen of the United States, residing at Muskegon, county of Muskegon, Michigan, have invented certain new and useful Improvements in Demonstrating Apparatus, of which the following is a full, clear, and exact description.

My invention relates to improvements in demonstrating apparatus, and has for its object to produce an apparatus for use in demonstrating the theory of perspective drawing and in the teaching of the art of perspective drawing.

The following is a description of an embodiment of my invention, reference being had to the accompanying drawings, in which,

Figure 1 is a perspective view of an embodiment of my invention. Fig. 2 is a plan view of the same. Fig. 3 is a side elevation. Fig. 4 is a plan view of the base-board. Fig. 5 is a vertical section on the line X—X, Fig. 3, showing a front elevation of the picture plane. Fig. 6 is a top and front view of a detail.

Referring more particularly to the drawings, A is a baseboard on which are mounted two vertical posts B—B′ having internal grooves in which is supported a transparent picture plane C, preferably of celluloid. Upon the baseboard, in the present embodiment, is a hexagon D having, in the present instance, one of its sides parallel to the picture plane.

D′ is a hexagonal plinth, the cross-section of which corresponds to the hexagon D. This plinth is superimposed directly upon the hexagon and accordingly has one of its faces parallel to the picture plane C.

E is a hollow support mounted upon the base A, being perpendicular thereto. This support E carries an adjustably mounted diaphragm or disk F having a small central perforation or peep-hole F′ constituting a sight. Passing through the sight-hole F′ are ten threads G, one of which is connected to each of the points 1, 2, 3, 4, 5, 6, 7, 8, 9, 10. These threads, as they extend between the sight-hole F′ and the various points upon the plinth, are straight, and small perforations 1′ to 10′ inclusive are made in the picture plane C for the passage of the same. These threads G, as they appear between the perforations F′ and the points upon the plinth, constitute what I call a cone of rays. These threads, one end of each of which is connected to the plinth, will pass through the picture plane C and the perforation F′ and down through the hollow support E, being drawn taut and secured to the pin H upon the bottom of the base. Upon the picture plane C are lines connecting the points 1′—2′, 2′—3′, 3′—4′, 4′—5′, 5′—6′, 6′—1′, 7′—8′, 8′—9′, 9′—10′ and 1′—7′, 2′—8′, 3′—9′, 4′—10′. The outline made by these lines is a correct perspective view of the plinth as seen through the peep-hole F′.

In addition to the threads G above mentioned there are three threads I′—I^2—I^3 which are each attached to the picture plane at one end at the points i'—i^2—i^3 respectively and passing through the sight-hole F′ and the hollow support E being drawn taut and also secured to the pin H. The line passing through the points i'—i^2—i^3 constitutes what is known as the "horizon line." The threads I′ and I^3 lie in a plane parallel to the base A and are parallel to the edges 1—2 and 3—4 of the plinth. The thread I^2 is perpendicular to the picture plane, and the point i^2 where it is connected thereto constitutes what I call the "center of vision." The point i' is the vanishing point for the edges 1—6, 3—4, 9—10 and any edges or lines upon the plinth parallel thereto. It is also the vanishing point for the corresponding lines 1′—6′, 3′—4′, 9′—10′ upon the picture plane and any line which corresponds to a line or edge upon the plinth which is parallel to the edges 1—6, 3—4, 9—10. The point i^3 is the vanishing point for the edges 1—2, 4—5, 7—8 and also all edges or lines parallel thereto upon the plinth. It is also the vanishing point for the lines 1′—2′, 4′—5′, 7′—8′, upon the picture plane and for all lines thereon which correspond to lines or edges upon the plinth parallel to the edges 1—2, 4—5, and 7—8. The point i^2 is the vanishing point for all lines and edges upon the plinth which are perpendicular to the picture plane and is also the vanishing point for the lines 2′—6′, 3′—5′ which would correspond to such perpendicular lines if drawn upon the plinth.

The intersection of the picture plane with the surface of the base A is represented by the line J, which is termed the "ground line" and "picture plane trace"; that is, the "ground line" is the extreme lower edge of

the picture plane, while the "picture plane trace" is a line on the baseboard which represents a top view of the picture plane. The point K is the intersection with the picture plane of the edge 9—10 or the corresponding edge of the hexagon upon the base.

K—L is a line upon the picture plane perpendicular to the ground line and of a length equal to the height of the plinth; the point L is the intersection with the picture plane of the edge 3—4. L^3 is a thread connecting this intersection with the point 3, being a continuation of the edge 3, 4.

K—i' and L—i' are lines which constitute vanishing traces for the edges 9—10 and 3—4 respectively, and which include the lines 9′—10′ and 3′—4′ upon the picture plane. In a similar manner lines K—i^3 and L—i^3 are other vanishing traces of the edges 7—8 and 1—2 respectively and include the lines 7′—8′ and 1′—2′ respectively upon the picture plane.

M—M′ are vertical projection lines of the points i' and i^3 respectively, the intersections m—m' with the ground line being vertical projections of such points.

N is a line upon the baseboard which is parallel to the picture plane trace, at any convenient distance therefrom, and constitutes the horizon line for the drawing upon the base A.

O—O′ are two lines upon the base which are parallel to the edges 9—10, and 7—8 of the plinth respectively and extend from the point P which is the vertical projection of the point of sight F′ at which the threads G meet. O—O′ are also the vertical projections of the threads I′ and I^3. The intersections of the lines O—O′ with the line J, *i. e.*, the points m—m', are vertical projections of the points i' and i^3, as indicated by the dotted projection lines M—M′.

m—n', and m'—n^3 are perpendicular lines from the points m—m' of the line J and the points n'—n^3 upon the line N constitute vanishing points corresponding to the vanishing points i'—i^3 on the picture plane.

Q is a line parallel to the horizon line N, and separated therefrom by the same distance as the line J is separated from the horizon line i'—i^2—i^3 and constitutes the ground line upon the base A.

K—K′ is a line perpendicular to the picture plane trace from the point K. The intersection K′ of this line with the line Q is the projection of the point K upon this line.

L′ is a point on the line K—K′ which is the same distance from K′ as the point L is from K, viz., a distance equal to the height of the plinth D′.

K′—n' and L′—n' are lines which constitute vanishing traces for the edges 9—10 and 3—4 respectively and which correspond to lines K—i' and L—i' on the picture plane C.

P—7, P—8, P—9, P—10, P—11 and P—12 are lines upon the base which are vertical projections of the threads G.

S, S′, S^2, S^3, S^4, S^5 are perpendicular projection lines from points where the lines P—7, P—8, etc., cut the picture plane trace. The perpendiculars S—S′ cut the vanishing trace L′—n' at 3″ and 4″ and the trace K′—n' at 9″ and 10″. The perpendiculars S^4 S^5 cut the vanishing traces L′—n^3 and K′—n^3 at 1″, 2″ and 7″, 8″ respectively. The line 1″—n' is a vanishing trace from the point 1″ to the point n' and the line 4″—n^3 is a trace from the point 4″ to the point n^3. These traces are cut by the perpendiculars S^3 S^2 at the points 6″ and 5″ respectively. The points 1″—2″—3″—4″—5″—6″—7″—8″—9″—10″ are connected by heavy lines and the figure formed is the same as the figure formed by the lines 1′—2′—3′—4′—5′—6′—7′—8′—9′—10′ on the picture plane and is a correct perspective of the plinth as seen from the point F′. Lines 2″—n^2 and 3″—n^2 are perpendiculars which vanish at the point n^2 which is the center of vision, and since they pass through the points 6″ and 5″ respectively, demonstrate the correctness of the perspective drawing upon the base.

In using my device for demonstrating the theory of perspective, I call the attention of the student to the fact that the drawing on the vertical screen is a correct perspective drawing of the object as seen through the sight; that the threads connecting the corresponding points of the picture and object represent the visual rays, and that the lines representing parallel sides of the object vanish at the same point on the horizon. I then point out the similarity between the drawing on the base board and the drawing on the picture plane, and that the drawing on the base board is obtained by projections; that the two drawings can be demonstrated the same as one another, and each of them can be demonstrated to be the correct perspective drawing of the object. That the horizon and ground lines of the two drawings correspond with one another, and that the sides in the base board drawing, which correspond with parallel sides in the object when extended, all intersect at a vanishing point, which is located on the horizon line. In this way, the complete theory of perspective drawing can be clearly demonstrated by showing the relation first of the drawing upon the vertical screen to the object, and next the relation of the drawing upon the base to the drawing on the screen, and hence to the object. It is invariably easy for the student to see that the drawing upon the vertical screen is a correct perspective of the drawing of the object, and by the use of my device he soon comprehends that perspective drawing requires simply the drawing upon

a horizontal surface of the perspective, as seen upon the vertical screen from the point of sight, and also what the vanishing point, horizon lines and grounding lines of such horizontal drawing correspond to.

What I claim is:

1. A demonstrating apparatus, comprising a base, a vertical screen mounted thereon, an object mounted on the base on one side of the screen and a sight mounted on the other side thereof, straight threads extending from the sight through said screen to points upon said object, and horizontal threads extending from said sight to points upon the screen and parallel to sides of the object, said base having a drawing covered by said object and corresponding in size and shape to the bottom thereof and lines corresponding to projections of said straight threads.

2. A demonstrating apparatus, comprising a base, a vertical screen mounted thereon, an object mounted on the base on one side of the screeen and a sight mounted on the other side thereof, straight threads extending from the sight through said screen to points upon said object, and horizontal threads extending from said sight to points upon the screen and parallel to sides of the object, said screen having lines corresponding to edges of the object connecting the points of the screen where the threads pass through it and constituting a perspective drawing of the object, said base having a drawing covered by said object and corresponding in size and shape to the bottom thereof and lines corresponding to projections of said straight threads.

3. A demonstrating apparatus, comprising a base, a vertical screen mounted thereon, an object mounted on the base on one side of the screen and a sight mounted on the other side thereof, straight threads extending from the sight through said screen to points upon said object, horizontal threads extending from said sight to points upon the screen and parallel to sides of the object, said screen having lines corresponding to edges of the object connecting the points of the screen where the threads pass through it and constituting a perspective drawing of the object, and also vanishing traces connecting said points with the points where said horizontal threads meet the screen, and a horizon line in which said last mentioned points lie, said base having a drawing covered by said object and corresponding in size and shape to the bottom thereof and lines corresponding to projections of said straight threads.

4. A demonstrating apparatus, comprising a base, a vertical screen mounted thereon, an object mounted on the base on one side of the screen and a sight mounted on the other side thereof, straight threads extending from the sight through said screen to points upon said object, horizontal threads extending from said sight to points upon the screen and parallel to sides of the object, said screen having lines corresponding to edges of the object connecting the points of the screen where the threads pass through it and constituting a perspective drawing of the object, and also vanishing traces connecting said points with the points where said horizontal threads meet the screen, and a horizon line in which said last mentioned points lie, said base having an extended horizontal surface provided with points and lines similar to those upon the screen, the horizon line on the base being parallel to the horizon line upon the screen and between the baseboard drawing of the object and the screen.

5. A demonstrating apparatus, comprising a base, a vertical screen mounted thereon, an object mounted on the base on one side of screen and a sight mounted on the other side thereof, straight threads extending from the sight through said screen to points upon said object, horizontal threads extending from said sight to points upon the screen and parallel to sides of the object, and a horizontal thread constituting an extension of one of the horizontal top edges of the object and connected to said object and the screen, said base having a drawing covered by said object and corresponding in size and shape to the bottom thereof and lines corresponding to projections of said straight threads.

6. A demonstrating apparatus, comprising a base, a vertical screen mounted thereon, an object mounted on the base on one side of the screen and a sight mounted on the other side thereof, straight threads extending from the sight through said screen to points upon said object, horizontal threads extending from said sight to points upon the screen and parallel to sides of the object, said screen having lines corresponding to edges of the object connecting the points of the screen where the threads pass through it and constituting a perspective drawing of the object, and also vanishing traces connecting said points with the points where said horizontal threads meet the screen, and a horizon line in which said last mentioned points lie, said base having an extended horizontal surface provided with points and lines similar to those upon the screen, the horizon line on the base being parallel to the horizon line upon the screen and between the baseboard drawing of the object and the screen, and lines upon the screen and the base indicating the relation between points on the screen and points on the base.

7. A demonstrating apparatus, comprising a base, a vertical screen mounted thereon, an object mounted on the base on one side

of the screen and a sight mounted on the other side thereof, straight threads extending from the sight through said screen to points upon said object, horizontal threads extending from said sight to points upon the screen and parallel to sides of the object, and also a horizontal thread extending from said sight to said screen and perpendicular thereto and also lines constituting vanishing traces connecting a plurality of said points with each of the points where said horizontal threads meet the screen, said base having a drawing covered by said object and corresponding in size and shape to the bottom thereof and lines corresponding to projections of said straight threads.

8. A demonstrating apparatus, comprising a base, a vertical screen mounted thereon, an object mounted on the base on one side of the screen and a sight mounted on the other side thereof, straight threads extending from the sight through said screen to points upon said object, and horizontal threads extending from said sight to points upon the screen and parallel to sides of the object, said sight having a peep-hole and being mounted on a support, and said threads passing through said peep-hole secured to a portion fixed relatively to said base, said base having a drawing covered by said object and corresponding in size and shape to the bottom thereof and lines corresponding to projections of said straight threads.

9. A demonstrating apparatus, comprising a base, a vertical screen mounted thereon, an object mounted on the base on one side of the screen and a sight mounted on the other side thereof, straight threads extending from the sight through said screen to points upon said object, and horizontal threads extending from said sight to points upon the screen and parallel to sides of the object, said base having means for removably attaching the object thereto, and a drawing of the bottom outline of said object covered by said object when properly placed on said base, said base having a drawing covered by said object and corresponding in size and shape to the bottom thereof and lines corresponding to projections of said straight threads.

10. A demonstrating apparatus comprising a base, a vertical screen thereon, an object supported by said base on one side by said screen, a sight supported by said base on the other side of said screen, two similar perspective drawings of said object, one on the screen and the other on the base on the sight-side of said screen, and threads passing through said screen from said sight to said object, said screen and base having lines thereon showing the relations between the object and the drawing on the screen and the drawing on the base, said screen and base both having corresponding ground and horizon lines all parallel to one another, and also vanishing traces which meet said horizon lines at corresponding points.

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