United States Patent [19]

Ihms

[11] **3,851,394**

[45] **Dec. 3, 1974**

[54] **PERSPECTIVE POLE**

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[21] Appl. No.: **340,960**

[52] **U.S. Cl.** ..... **33/1 K,** 33/77, 33/296, 35/16

[51] **Int. Cl.** **B43l 13/14**

[58] **Field of Search** ..... 33/16 K, 296, 161, 18 C, 33/77; 35/16

[56] **References Cited**

UNITED STATES PATENTS

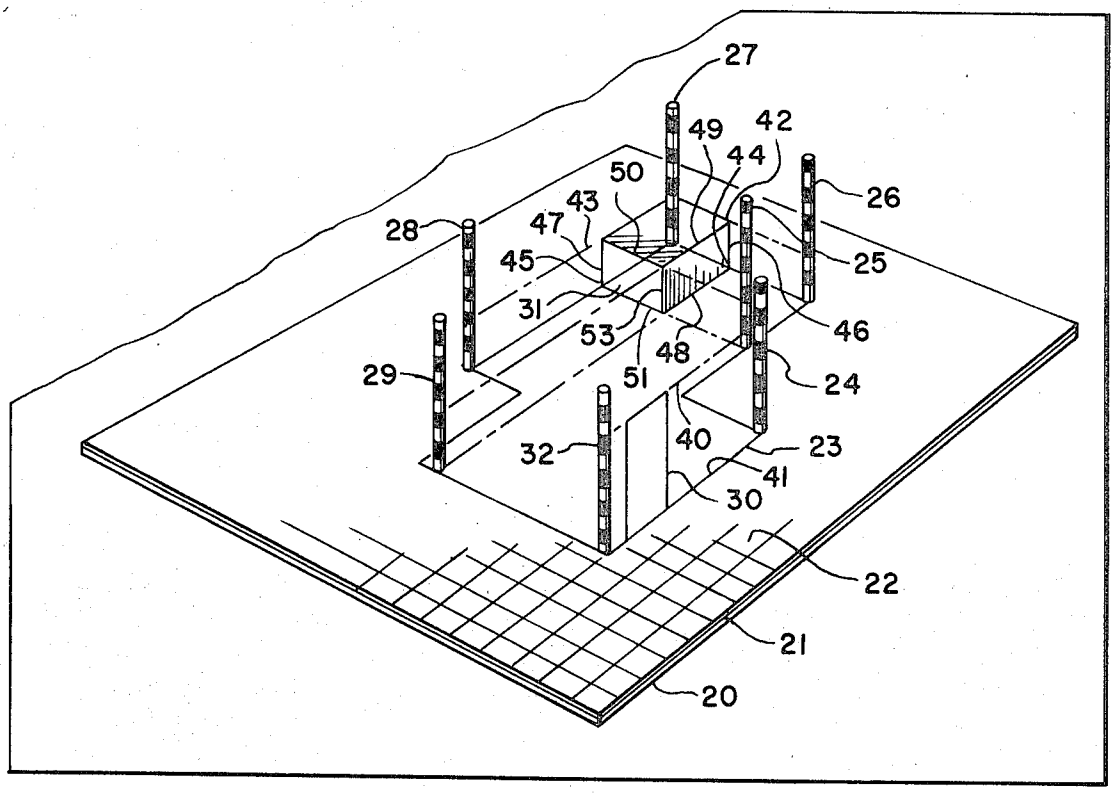
2,835,975	5/1958	Zimmerman	33/296
2,915,831	12/1959	Parker	35/16

Primary Examiner—William D. Martin, Jr.
Attorney, Agent, or Firm—Cahill, Sutton & Thomas

[57] **ABSTRACT**

Apparatus is disclosed for making scaled perspective views of two-dimensional drawings. The drawing illustrating a figure to be drawn in perspective is placed upon a magnetically responsive medium. A transparent grid pattern is laid over the drawing to provide coordinates for the figure in the X and Y axis. A plurality of standing uniformly banded poles are placed at selected points of the drawing to provide coordinates for the figure in the Z axis. The lower end of each of the poles includes a magnetic element, which element is attracted to the magnetically responsive medium and retains the pole vertically oriented and positioned upon the figure. The combination of drawing, grid and poles, is photographed from the desired perspective distance and angle. The photographic negative is projected onto a screen to display the desired view. The projected image is reproduced by tracing the lines of the figure from the superimposed X, Y and Z coordinates.

2 Claims, 4 Drawing Figures



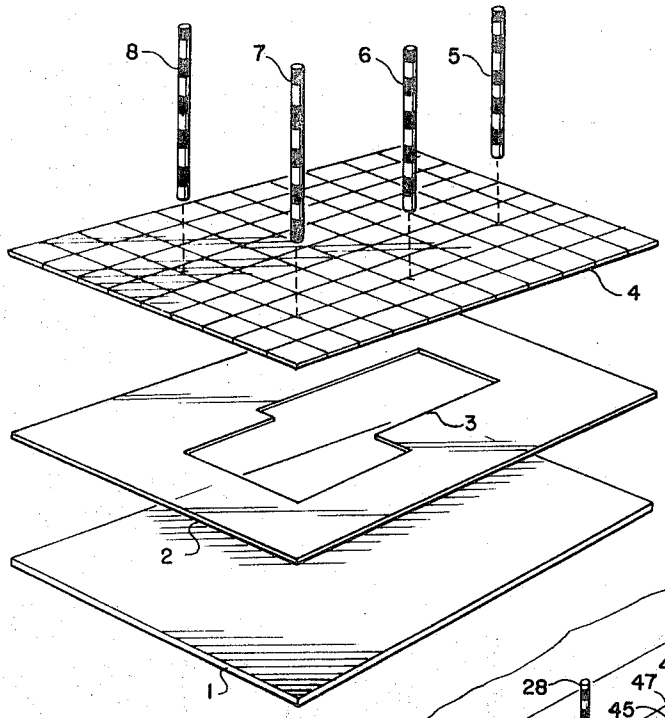


Fig. 1

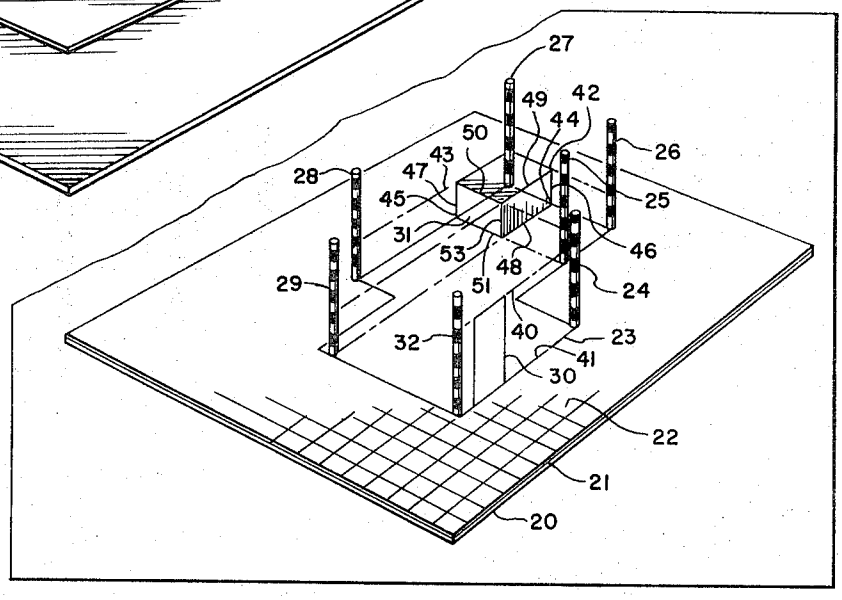


Fig. 2

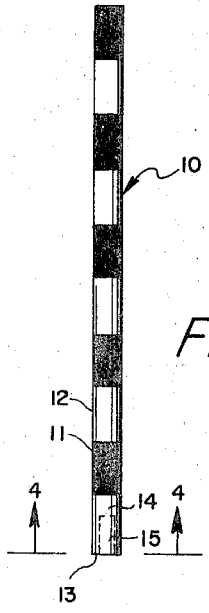


Fig. 3

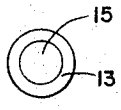


Fig. 4

PERSPECTIVE POLE

The present invention relates to drafting instruments, and more particularly, to drafting instruments for producing perspective views.

One of the more time-consuming chores performed by a draftsman is that of providing perspective views of drawings or three-dimensional figures. Because of this chore, many devices have been developed in attempts to alleviate the amount of work involved. In U.S. Pat. No. 3,244,065, there is shown a photographic apparatus for recording and projecting a two-dimensional image of a three-dimensional article. The apparatus is complicated and too costly for use by anyone other than a large drafting organization.

Various techniques have been employed using stereoscopic photography to obtain perspective illustrations of either two or three-dimensional objects. The following U.S. patents are representative of efforts along these lines: No. 3,602,592; No. 3,663,103; No. 3,682,063; No. 3,694,072.

In U.S. Pat. No. 2,338,729, there is shown apparatus for producing perspective views of either two or three-dimensional figures. The drawing or figure is angularly lined upon one panel. The image of the drawing or object, as seen through another panel, may then be traced, which tracing will show the drawing or figure from the desired angle. The apparatus is bulky, requires a plurality of alignments and would be difficult to use to obtain precise perspective drawings.

U.S. Pat. No. 2,738,584 teaches the use of a grid system upon which a scale model of the apparatus to be drawn is placed. A plurality of photographs are made of the model and associated grid for subsequent assembly into a composite photograph. Working drawings are made from the composite photograph. Necessarily, such a system requires elaborate model making skills as well as photographic expertise.

U.S. Pat. No. 3,280,697, discloses a photographic technique by which three separate views of a figure are photographed. The separate views are superimposed upon one another and projected onto drawing paper. A resulting projection is traced to obtain the perspective view of the figure.

U.S. Pat. No. 3,659,353, teaches the use of a plurality of modules placed upon a grid, which grid includes certain indicia. The modules may be rearranged upon the grid with respect to the indicia until a satisfactory pattern is obtained. Magnetic means may be associated with each of the modules to cooperate with an underlying metallic plate to retain the modules in place. The final configuration is photographed and the image obtained may be projected and traced. The primary purpose of the invention is that of establishing a layout of plant or office space.

In each of the above enumerated patents, there runs a common thread. The apparatus producing the most accurate perspective views of either two or three dimensional objects require extensive and expensive apparatus. For this reason, such apparatus is necessarily precluded from use in low overhead drafting operations. In addition, the necessary adjustments and alignment necessary to effect the apparatus may be sufficiently frustrating to a skilled draftsman that he may prefer to dispense with the equipment all together.

It is therefore a primary object of the present invention to provide simple apparatus for use in establishing

the coordinates within a perspective view of a two dimensional drawing.

Another object of the present invention is to provide inexpensive apparatus for establishing the X, Y, and Z axis in perspective views of two dimensional drawings depicting three dimensional objects.

Still another object of the present invention is to provide a plurality of calibrated members for establishing the relative elevation between various points depicted upon a two dimensional drawing.

Yet another object of the present invention is to provide apparatus positioned upon a two dimensional drawing for establishing the relative heighth of various points without obscuring critical elements of the drawing.

A further object of the present invention is to provide apparatus for establishing the relative heighth of various elements of a three dimensional figure when viewed from any angle.

A still further object of the present invention is to provide apparatus for establishing the X, Y, and Z coordinates of any three dimensional object when viewed from any angle.

A still further object of the present invention is to provide apparatus coordinated in the X, Y and Z axis for depicting the relative breadth, length and heighth of any two or three dimensional object viewed from any angle.

These and other objects of the present invention will become apparent to those skilled in the art as the description thereof proceeds.

The present invention may be described with more specificity and clarity with reference to the following figures, in which:

FIG. 1 illustrates an exploded view of the present invention.

FIG. 2 is a perspective view of the present invention used in conjunction with a drawing.

FIG. 3 illustrates a magnetic pole of the present invention.

FIG. 4 is an end view of the magnetic pole taken along lines 4—4, as shown in FIG. 4.

In FIG. 1 there is shown an exploded view of a representative combination of elements cooperating with one another in accordance with the teachings of the present invention. A magnetically responsive platform, such as a metal plate **1**, is placed upon the drawing table (not shown). A drawing **2** depicting a structure **3** is placed upon plate **1**. A transparent sheet having a grid **4** marked or etched therein is, in turn, positioned adjacent drawing **2**. The grid **4** is of a scale commensurate with the scale of structure **3**. A plurality of slim poles, such as poles **5, 6, 7** and **8**, are placed upon grid **4**, at locations corresponding to significant points of structure **3**.

Referring momentarily to FIGS. **3** and **4**, the constructional features of a representative pole **10** will be described. A plurality of alternately coded bands, such as bands **11** and **12**, are disposed along the length of pole **10**. The width of each of bands **11** and **12** are uniform and are commensurate with the scale used for structure **3**. End **13** of pole **10** is perpendicular to the axis of the pole so that the pole may be stably mounted in the upright position. An axial cavity **14** is disposed within end **13**. A magnet **15** is disposed within cavity **14**.

As poles **10** are intended to be relatively slim in order that they not obscure any more of the drawing than is absolutely necessary, the area of end **13** may be too small to provide a stable base. The function and purpose of magnet **15** is that of establishing a magnetically attractive force between each of the poles positioned upon the grid and the underlying metal plate. The magnetic force will tend to stabilize each of the poles and prevent inadvertent toppling of the poles. Thus, a magnetic force augments the stability of the pole without further obstructing the view of the drawing.

Although pole **10** is shown in the shape of a dowel, it is anticipated that pole **10** may be square, rectangular or of any other cross-sectional configuration.

The operation of the present invention will be described primarily with respect to FIG. **2.** FIG. **2** is representative of two distinct steps in carrying out the teachings of the present invention. First, it illustrates the use of banded poles **10** in conjunction with a drawing having a grid overlay. Second, it illustrates the projected image of a photographic negative, which negative was taken at the angle and distance corresponding to the perspective view to be drawn.

In operation, the drawing **21,** having a structure **23** drawn thereon, is placed upon a magnetically responsive metallic plate **20.** An overlay grid **22,** of a scale corresponding to or commensurate with a scale of structure **23,** is placed over the drawing **21.**

An assumption will now be made that structure **23** corresponds to a floor plan, which floor plan illustrates a door **30** and an internal cubicle **31.** Further, it will be assumed that a perspective view of the floor plan showing X, Y, and Z axis dimensions of the floor plan, door and cubicle is to be prepared at the angle and distance represented by the view of FIG. **2.**

Each of a plurality of poles **24, 25, 26, 27, 28,** and **32** is placed at a location wherein the vertical dimension of either door **30** or cubicle **31** is of importance. In example, poles **24** and **32** are placed along a line in the plane of door **30** and at either side of door **30.** And, poles **26** and **27** are placed in the plane of one side of cubicle **31** while poles **27** and **28** are placed in another plane of cubicle **31.**

The width of each of the alternately colored bands abut each of the poles is of a scale corresponding to that of structure **23** or to a different scale, depending upon the effect to be achieved. Further, the heighth of door **30** and cubicle **31** is obtained from information contained within drawing **21** or from ancillary sources.

Poles **24, 25, 26, 27, 28, 29,** and **32** have been positioned so that two poles are in a plane having a necessary vertical dimension. A photograph of the combination of elements shown in FIG. **2** is taken at the perspective view to be obtained. The photographic negative is thence projected onto a drawing surface. The photographing and projecting steps are not shown as they are well known to those skilled in the art. It is anticipated that photographic positives, as well as any other optical reproduction apparatus may also be used.

The perspective view projected is traced upon the drawing surface in the following manner. The basic floor plan of structure **23** may be first roughed in by tracing the outline with the help of the projected grid **22.** The vertical dimensions of the objects, such as door **30** and cubicle **31,** are drawn in the following manner.

If it is assumed that the heighth of door **30** is equivalent to the width of seven bands of poles **24** and **32,** a line **40** is drawn therebetween at these points. This line represents the upper extent of door **30.** Line **41,** traced along structure **23,** represents the lower extent of door **30.** The sides of door **30** may be drawn by extending vertical lines from structure **23** at the point corresponding to either side of the door on line **41.** The two lines **40** and **41,** representing the upper and lower extremities of door **30** are convergent because the projected length of the seven bands of pole **32** is greater than the projected length of the seven bands of pole **24.** The difference in projected lengths is due to the perspective view of the two otherwise equally sized poles. Thereby, door **30** as now drawn is drawn in perspective.

If it is assumed that cubicle **31** is of a heighth equivalent to three bands of the poles, a line **42** is drawn between the tops of the third bands of poles **26** and **27.** Similarly, another line **43** is drawn between the tops of the third band of poles **27** and **28.** Two upper edges of cubicle **31** lie on these two lines. The length of the sides of cubicle **31** extending between poles **26** and **27** and between poles **27** and **28** is determined by markings upon structure **23.** At these two points **44** and **45,** respectively, vertical lines **46** and **47** are drawn. These lines represent two of the vertical corners of cubicle **31.**

A line **48** is traced along the line representing one lower edge of cubicle **31** and passing through point **44.** Pole **29** is positioned on line **48,** or along an extension thereof, as shown in FIG. **2.** A line **49** is drawn through the intersection of lines **46** and **42** and the top of the third band of pole **28.** Thus, line **49** represents one upper edge of cubicle **31.** Line **51** is traced along the line representing the lower edge of one end of cubicle **31** passing through point **45.** Pole **25** is positioned on line **51,** or along an extension thereof, as shown in FIG. **2.** Line **50** is drawn through the intersection formed by line **47** and line **43** and the top of the third band of pole **25.** Thus, lines **51** and **50** represent the horizontal edges of one end of cubicle **31.** A line **53** is drawn through the intersections of lines **48** and **51** and lines **49** and **50.** Thus, line **53** represents one vertical edge of one end of cubicle **31.**

By the above described method for drawing door **30** and cubicle **31** it will become apparent that only the vertical lines are parallel to one another and the door and the cubicle will be drawn in perspective.

From the above teaching, it may be understood that a perspective view of any three dimensional object can be just as easily drawn without the need for extensive or expensive drafting equipment.

While the principles of the invention have now been made clear in an illustrative embodiment, there will be immediately obvious to those skilled in the art many modifications of structure, arrangement, proportions, the elements, materials, and components, used in the practice of the invention which are particularly adapted for specific environments and operating requirements without departing from those principles.

I claim:

1. A method for drafting perspective views of three dimensional objects depicted in drawings, said method comprising the steps of:

A. laying the drawing upon a base plate;

B. positioning a grid system adjacent said drawing;
C. mounting a plurality of graduated poles at selected points on said grid;
D. displaying an image of the structure produced in accordance with steps A–C, the angle and depth of said image corresponding to the perspective view to be drawn;
E. tracing the X and Y axis dimensions of the object depicted by said drawing; and
F. drawing a plurality of lines keyed to the vertical gradations of said poles, said plurality of lines determining the Z axis dimensions of the object depicted by said drawing; whereby, the combination of traced and drawn lines depict the object in perspective.

2. A method for drafting perspective views of three dimensional objects depicted in drawings, said method comprising the steps of:
A. laying the drawing upon a base plate;
B. mounting a plurality of graduated poles at selected points on said grid;
C. displaying an image of the structure produced in accordance with steps A–B, the angle and depth of said image corresponding to the perspective view to be drawn;
D. tracing the X and Y axis dimensions of the object depicted by said drawing; and
E. drawing a plurality of lines keyed to the vertical gradations of said poles, said plurality of lines determining the Z axis dimensions of the object depicted by said drawing; whereby, the combination of traced and drawn lines depict the object in perspective.

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