United States Patent

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[73] Assignee **Oak Electro/Netics Corporation**
Crystal Lake, Ill.
Continuation-in-part of application Ser. No. 747,717, July 25, 1968.

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[54] **ARCUATE PRISM DISPLAY**
15 Claims, 5 Drawing Figs.

[52] **U.S. Cl.** **116/129,** 116/136.5, 240/2.1, 324/115, 350/112, 353/42
[51] **Int. Cl.** **G09f 9/00**
[50] **Field of Search** 116/129, 133, 116, 124, 136.5; 240/2.1; 324/154, 115; 353/13, 14, 81, 40, 41, 42; 350/112, 110, 286; 177/178

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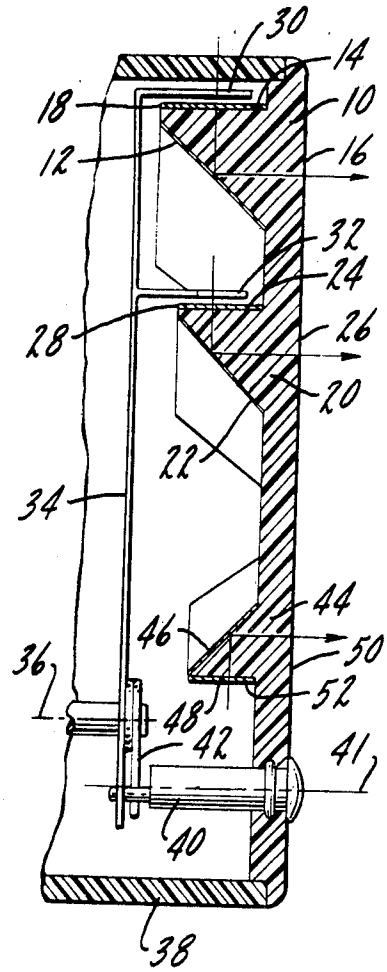
ABSTRACT: A display device using an arcuate-shaped prism having an object surface, an arcuate-reflecting surface and an image surface. There is fixed indicia positioned adjacent the object surface and movable indicator members arranged to move in a path adjacent the object surface such that the display at the image surface will provide useful information in the form of the relationship between the fixed indicia and movable indicator members.



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SHEET 1 OF 2

FIG. 1.

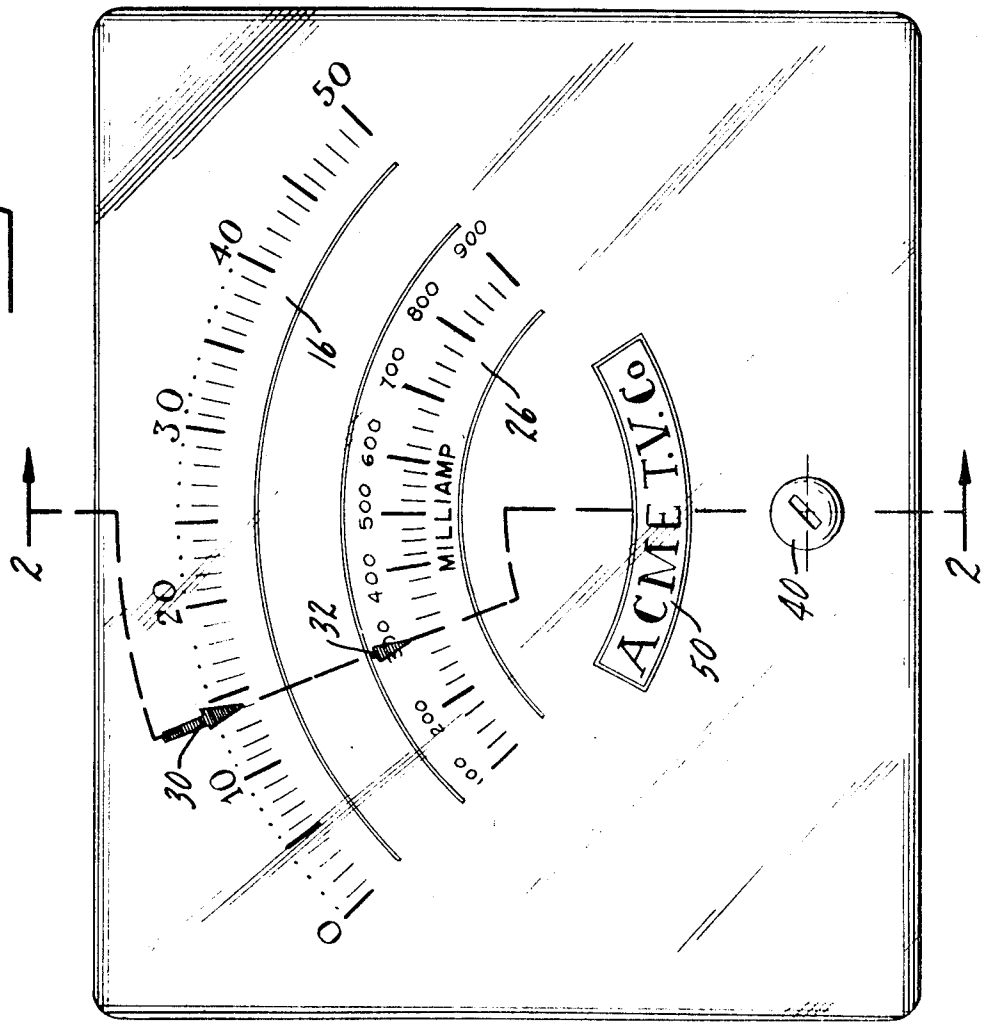

FIG. 2.

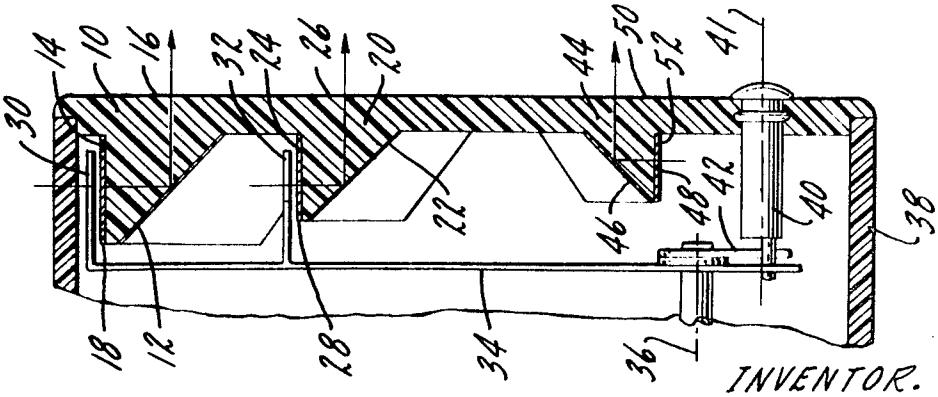

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fig. 3.

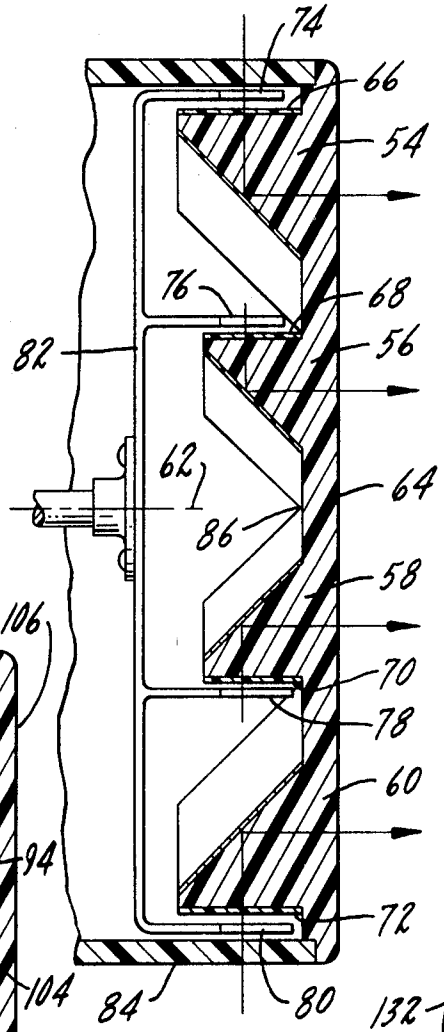


fig. 4.

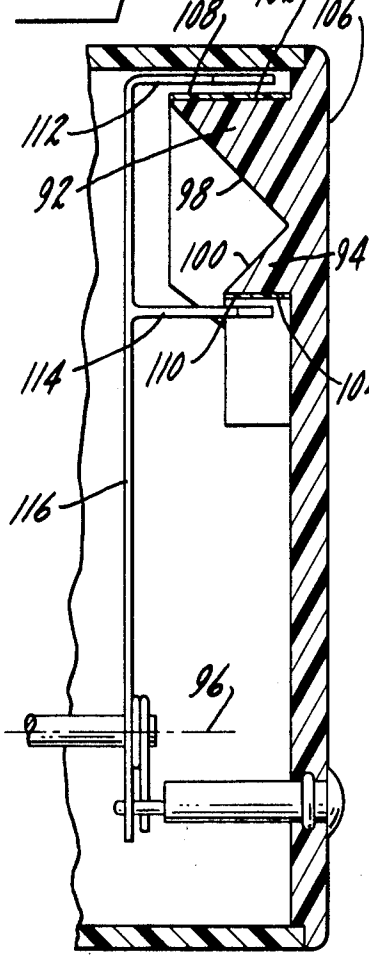
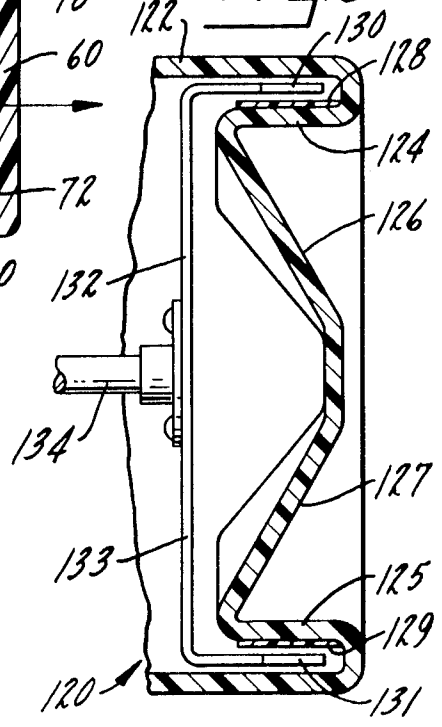


fig. 5.



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ARCUATE PRISM DISPLAY

SUMMARY OF THE INVENTION

The present invention relates to display devices utilizing reflecting prisms and is a continuation-in-part of my copending application Ser. No. 747,717 filed July 25, 1968.

A primary purpose of the present invention is a display device utilizing an arcuate-shaped prism to indicate the relationship between relatively movable indicator members positioned adjacent the object surface of the prism.

Another purpose is a display device of the type described including a plurality of arcuate-shaped prisms, each displaying information at the same image surface.

Another purpose is a prism display device in which a plurality of concentrically arranged arcuate prisms are positioned to display information at the same image surface.

Another purpose is a display device of the type described in which the relationship between a plurality of movable indicator members and a plurality of fixed indicia is simultaneously available at a single-image surface.

Other purposes will appear in the ensuing specification, drawings and claims.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention is illustrated diagrammatically in the following drawings wherein:

FIG. 1 is a front view of a display device of the type described,

FIG. 2 is a vertical section taken along line 2–2 of FIG. 1,

FIG. 3 is a vertical section, similar to that of FIG. 2, showing a modified form of the invention,

FIG. 4 is a vertical section, similar to FIG. 3, showing a further form of the invention, and

FIG. 5 is a vertical section, again similar to FIG. 3, showing yet a further modified form of prism display device.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The present invention uses the principle of a reflecting prism to display indicia or some other form of information from one position to another. As is well known, a prism may include an object surface, an image surface and a reflecting surface with the conventional relationship being that of a right triangle in which the reflecting surface is the hypotenuse. If such a prism is constructed of a suitable transparent or translucent material, for example glass, plastic or the like, and the reflecting surface is highly polished, an object positioned adjacent the object surface can be projected or reflected to the image surface. In some applications it may be desirable to coat the reflecting surfaces with a mirrorized layer, for example a vacuum deposit of aluminum has been found to be satisfactory. Forms of paint may also be used. What is important, however, is to provide a layer or surface at the reflecting surface which is effective and efficient to project whatever is at the object surface to the image surface.

Turning to FIGS. 1 and 2, a first prism is indicated at 10 and has a reflecting surface 12, an object surface 14, and an image surface 16. As shown herein, the prism 10 is in the form of an arc, or is arcuately shaped. The object surface 14 will be arcuate, as will be the reflecting surface 12, whereas, the image surface will be generally flat or in a single plane. In come applications the image surface may be slightly curved or convex to increase the field of vision. Positioned adjacent the object surface 14 is a legend or the like indicated at 18 and which may be a tape or film or some other similar means containing useful information. As shown in FIG. 1 the tape 18 may include calibrations, as in a meter face.

Adjacent the first arcuate prism 10 is a second arcuate prism 20, which again has an arcuate-reflecting surface 22, an object surface 24, again arcuate in configuration, and an image surface 26 which s coplanar or a part of the image surface 16. A suitable legend or indicia 28 is positioned adjacent

the object surface 24. The prisms 20 and 10 are concentric in that their arcs are drawn from a common center.

Positioned adjacent each of the object surfaces 14 and 24 are movable pointers, or movable indicator members, indicated at 30 and 32. The movable indicator members or pointers 30 and 32 are both part of an arm 34 which is arranged for pivotal movement about an axis 36 which is also the axis for the arcs defining the prisms 10 and 20. Movement of the arm 34 is effective to move the pointers 30 and 32 in paths uniformly spaced from the object surfaces 14 and 24 so that the pointers will move relative to the fixed legends 18 and 28. Thus, useful information is provided at the image surfaces by the relationship of the pointers to the fixed legends or fixed indicia. In some applications there are two sets of movable indicator members indicia in which case the display would be the relationship between relatively movable indicator members.

As can be seen from the above, the arcuate-shaped prisms forming the display device are useful in an electric meter, or any other kind of meter which is arranged to measure a given parameter. The image surfaces or faces 16 and 26 may be a part of a single glass face, as illustrated in FIG. 2, and there may be a cover 38 or housing, which completes the entire disclosure. A pin 40 positioned at the axis 41 is used for meter arm adjustment or calibration through a spring or the like 42. In addition to the prisms for use in displaying information relative to the condition being measured, a third arcuate-shaped prism, indicated at 44, has a reflecting surface 46, an object surface 48 and the same image surface 50 as the other two arcuate prisms. In this instance, indicia 52 positioned adjacent the object surface 48 is in the form of a name plate or other suitable information describing the function or manufacturer of the display device or meter in question.

The present invention is particularly advantageous in providing a meter in which there is no parallax. The pointers 30 and 32 appear in the same plane as the indicia at the image surface.

Turning to FIG. 3, a plurality of arcuate prisms are indicated at 54, 56, 58 and 60. Each of these prisms is concentrically arranged about a central axis 62 with the prisms 60 and 54 having generally the same radius and the prisms 56 and 58 having generally the same radius, but smaller than that of the outside prisms 54 and 60. Each of the four prisms have object surfaces, reflecting surfaces and a common image surface 64. Positioned adjacent each of the object surfaces are suitable legends or indicia indicated at 66, 68, 70 and 72. Movable pointers 74, 76, 78, and 80 are arranged to be displaced in paths closely adjacent the legends 66—72. Each of the pointers 74—80 are attached to a movable arm 82 which revolves about the axis 62. A suitable housing or cover is indicated at 84 encloses the movable arms as well as the prisms.

Each of the reflecting surfaces on the display device of FIG. 3, as well as that of FIGS. 1 and 2, may be suitably mirrorized or treated or polished to provide a high degree of reflection.

The device in FIG. 3 is substantially the same as that in FIGS. 1 and 2, except that it provides four display areas in the form of arcuate prisms. There are prisms on opposite sides of the axis 62 and in order to provide a compact display device the reflecting surfaces of prisms 56 and 58 join each other at opposite ends of their respective arcs, as indicated at 86.

In FIG. 4 a pair of back-to-back prisms 92 and 94, again generally arcuate in configuration, are concentrically arranged about an axis 96. Prism 92 and 94 each have arcuate-reflecting surfaces, indicated at 98 and 100, and generally curved object surfaces 102 and 104. The prisms have a common image surface 106 which may also be the meter face. Tapes or the like indicated at 108 and 110 are positioned adjacent the object surfaces 102 and 104 and also movable pointers 112 and 114 attached to an arm 116. The arm 116 will rotate about the axis 96, as described in connection with that form of the invention illustrated in FIGS. 1 and 2. The essential difference between the structure of FIG. 4, and that of FIGS. 1 and 2, is that the prisms are arranged in a back-to-

back fashion and also, the outer prism **92** is larger than the inner prism **94**. In other respects the structures are generally the same.

In FIG. **5**, the prism principle is utilized in a display device which does not have an image face, but rather the reflecting surface itself will be used to display the information from the object surface. A housing indicated generally at **120** has an outer peripheral section **122** which forms the main enclosure for the meter, assuming that is the application in question. There are a pair of arcuate object surfaces **124** and **125** and a pair of arcuate or curved reflecting surfaces **126** and **127**. The arcuate object and reflecting surfaces may extend through any particular angular distance, depending upon the application. Adjacent the object surfaces **124** and **125** are fixed indicia tapes **128** and **129**, which may be merely colored tapes or may contain alpha-numeric information, or a graphic design. Positioned outside of the fixed indicia **128** and **129** are pointers **130** and **131** which provide the movable indicator members for display by the reflecting surfaces **126** and **127**. Both of the pointers **130** and **131** are attached to arms **132** and **133**, with the arms in turn being rotatable with a shaft **134**.

As stated above, the primary difference between the structure of FIG. **5** and the other structures illustrated in FIGS. **1**—**4** is the lack of an image surface. In effect, the prism may be formed by sheet material bent into an appropriate shape so that the object and reflecting surfaces are integral with each other. Although there is no actual image surface, the information from the object surface willable reflected by the reflecting surface the rear of which may be suitably mirrorized, as discussed above. The lack of an image surface per se does not prevent the information from the object surface from being displayed.

Although the invention has been described in connection with a meter, for example an electric meter, obviously it has substantially broader use. The combination of an arcuate prism with relatively movable indicator members at the object face may be used in an auto speedometer, as well as many other applications. In addition, although the various forms described herein utilize pointers moving about a common axis which is concentric with the axis for the prisms, the invention should not be limited to this construction. It may be desirable in some applications to have several separate axes for the pointers and prisms.

The arcuate prisms have been described as having arcuate object surfaces and generally flat image surfaces. In some constructions the image surface may be arcuate and the object surface generally flat. Whereas I have used the term "arcuate" to describe the geometric shape of the prism, "curved" is another appropriate term. In some applications, the length of the arcuate or curved prism may extend through substantially 360° or in a complete circle. The latter configuration would primarily be for ease in construction as generally the indicator members do not move through 360°.

Whereas the preferred form of the invention has been shown and described herein, it should be realized that there are many modifications, substitutions and alterations thereto within the scope of the following claims.

I claim:

1. A display device including an arcuate-shaped prism having an object surface, an arcuate-reflecting surface and an image surface, indicia adjacent said object surface, said object and image surfaces being positioned relative to said reflecting surfaces to display said indicia at said image surface, and indicator members movable relative to said first-named indicia in a path adjacent said object surface such that the relationship between said relatively movable indicator members is displayed at the image surface.

2. The structure of claim **1** further characterized by and including a second arcuate-shaped prism having an object surface, an arcuate-reflecting surface and an image surface, and movable indicator members adjacent said second named object surface for display at its corresponding image surface.

3. The structure of claim **2** further characterized in that said movable indicator members are arranged for simultaneous and coordinated movement.

4. The structure of claim **3** further characterized in that said arcuate-shaped prisms are generally concentric.

5. The structure of claim **2** further characterized in that said object surfaces are arcuate and said image surfaces are generally flat and in the same plane.

6. The structure of claim **4** further characterized by and including a third arcuate-shaped prism, having an object surface, an arcuate-reflecting surface and an image surface, and fixed indicia adjacent said last-named object surface for display at its image surface.

7. The structure of claim **4** further characterized in that said movable indicator members are arranged for movement in concentric paths, which paths are generally uniformly spaced from the associated object surfaces.

8. The structure of claim **7** further characterized in that each of said movable indicator members are fixed to a pivotal member, which pivotal member is arranged for movement about the center of said concentric arcuate prisms.

9. The structure of claim **7** further characterized by and including a housing enclosing said movable indicator members and prisms.

10. A display device including a plurality of arcuate-shaped prisms, each having an arcuate object surface, an arcuate-reflecting surface and a generally flat image surface, said image surfaces all being coplanar and said arcuate-shaped prisms all being concentrically arranged, fixed indicia adjacent each object surface, and a movable indicator members adjacent each object surface and positioned to move in a path adjacent each object surface such that the relationship between each fixed indicia and its associated movable indicator members is displayed at the coplanar image surfaces.

11. The structure of claim **10** further characterized in that each of said movable indicator members are arranged for simultaneous movement about a common axis.

12. The structure of claim **10** further characterized in that the arcuate-reflecting surfaces of at least two of said prisms adjoin each other at spaced points.

13. A display device including a curved prism having a curved reflecting surface and object and image surfaces in reflecting position relative thereto, indicia adjacent said object surface, and an indicator member movable relative to said first-named indicia in a path generally uniformly spaced from said object surface such that the relationship between said relatively movable indicia is displayed at the image surface.

14. A display device including a curved prism having a curved reflecting surface and an object surface in reflecting position relative thereto, fixed indicia adjacent said object surface, and movable indicator member positioned to move in a path generally uniformly spaced from said object surface such that the relationship between said fixed indicia and movable indicator member will be reflected by said reflecting surface.

15. The structure of claim **14** further characterized in that said object surface is curved.