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J. H. REDMAN
CATHODE RAY TUBE DISPLAY DEVICE HAVING A
HEMISPHERICAL DISPLAY AREA
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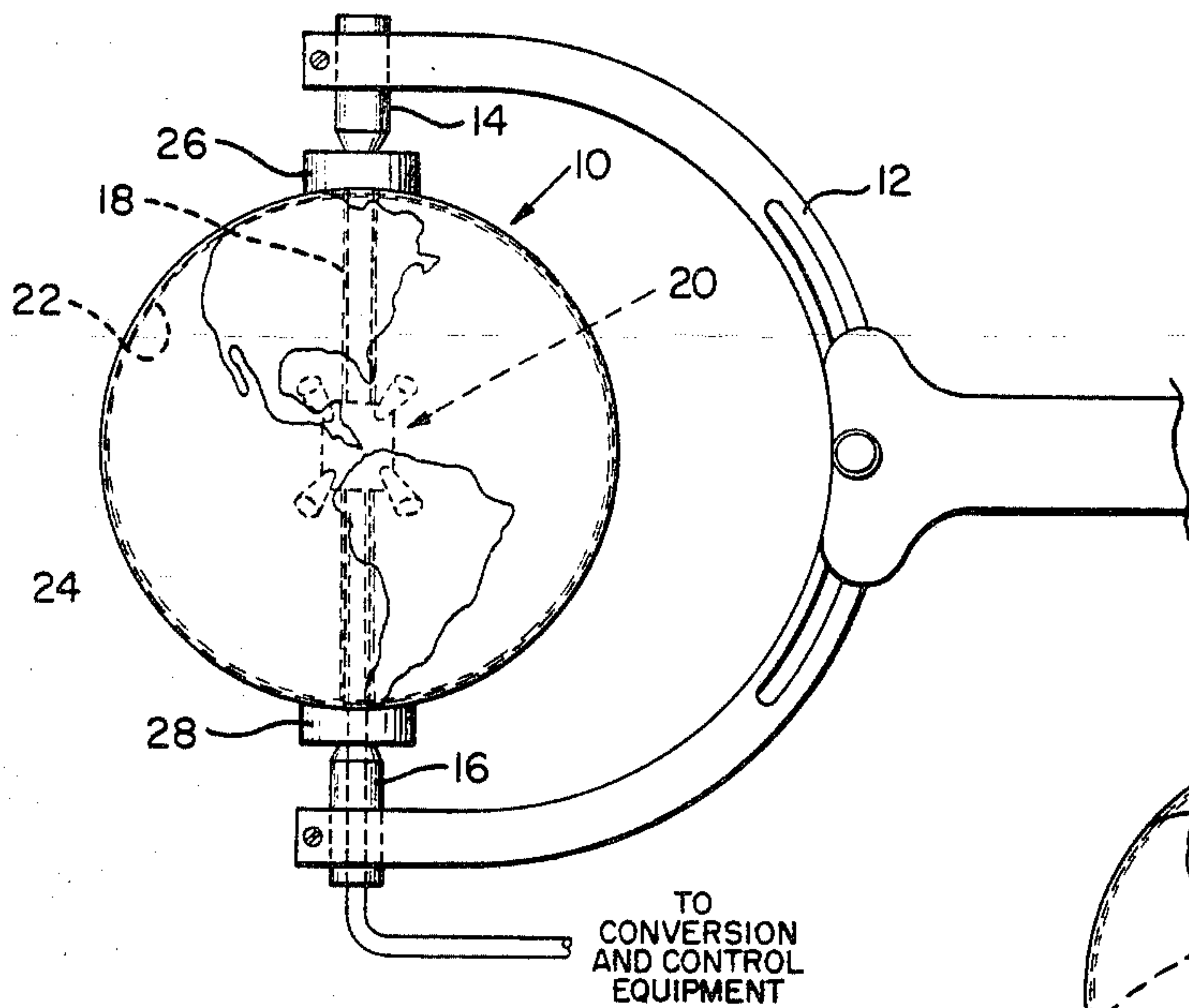


Fig. 1

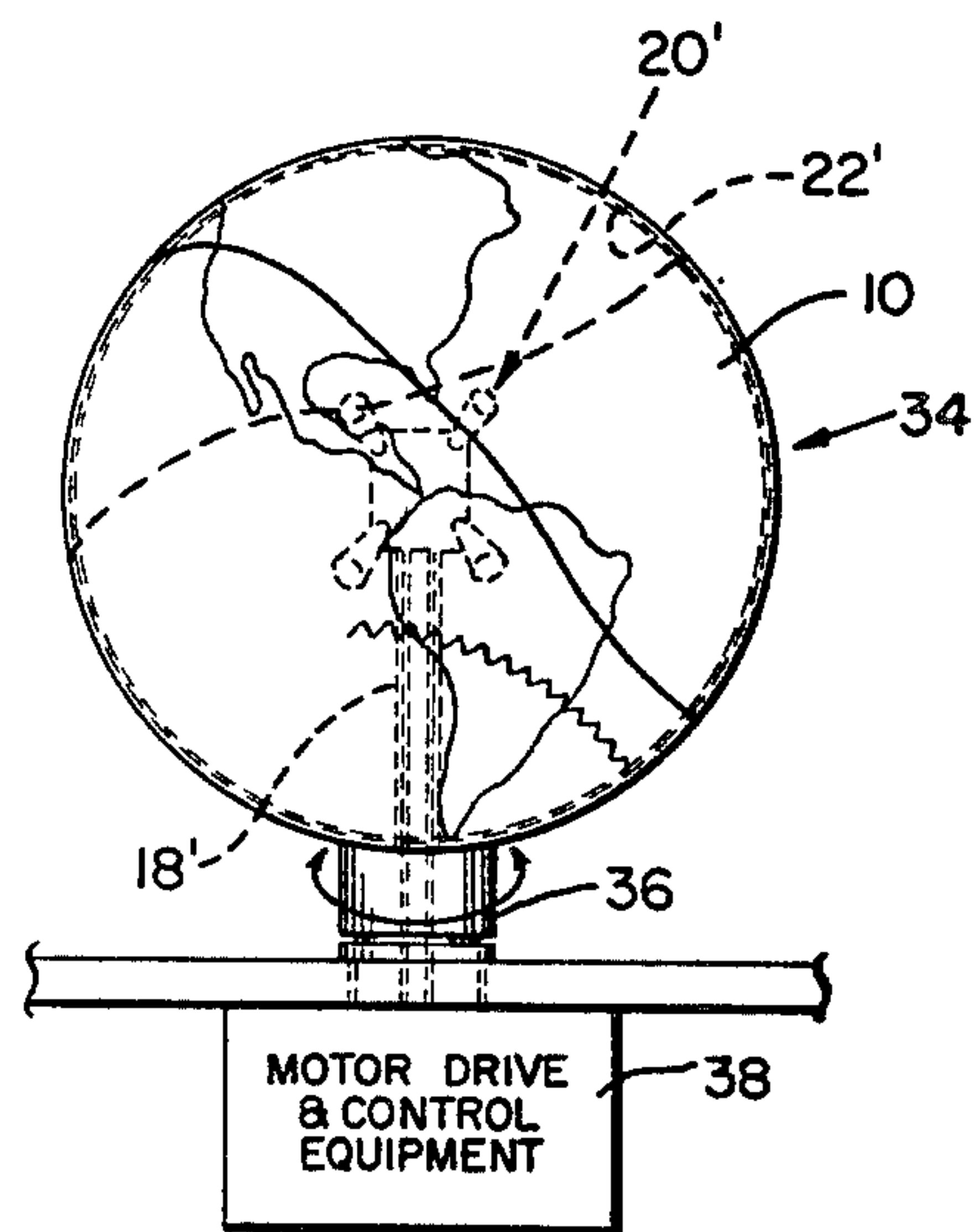


Fig. 2

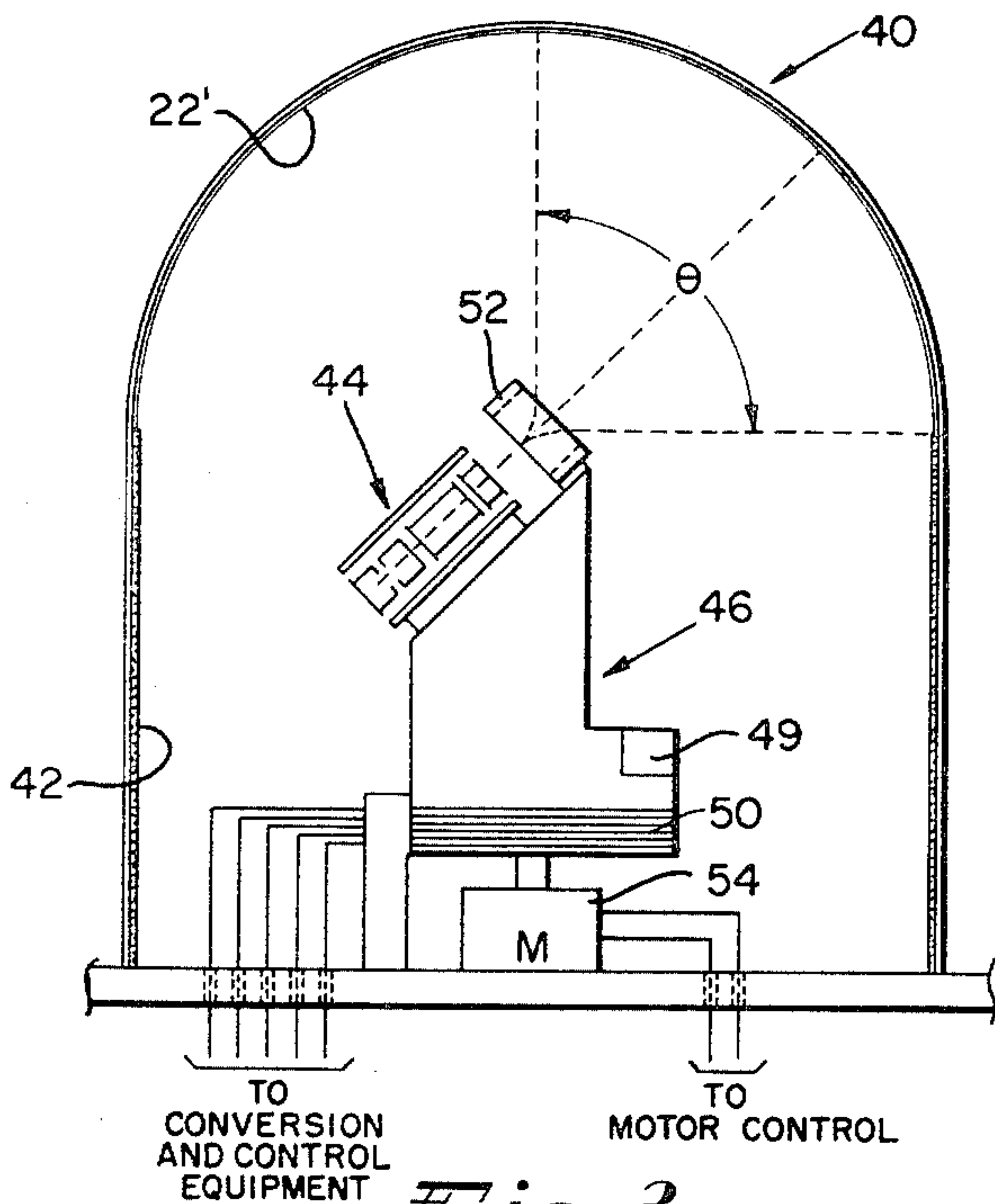


Fig. 3

INVENTOR.
JAMES H. REDMAN
BY *George J. Seligson*
ATTORNEY

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CATHODE RAY TUBE DISPLAY DEVICE HAVING A HEMISPHERICAL DISPLAY AREA

James H. Redman, San Diego, Calif., assignor, by mesne assignments, to Stromberg Carlson Corporation, Rochester, N.Y., a corporation of Delaware
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6 Claims. (Cl. 315-13)

ABSTRACT OF THE DISCLOSURE

A direct view cathode-ray display device including an envelope having at least a curved portion with a phosphor coating excitable by a beam of electrons generated from an electron gun structure within the envelope and means provided for rotating the envelope or rotating the electron gun with respect to the envelope, the envelope being provided in the form of a sphere or hemisphere representing the earth, another planet or other spatial system.

This invention relates to a dynamic direct view cathode-ray display device and, more particularly, to an improved display device representing the earth, another planet or other spatial system.

The display device envisaged by the present invention comprises a portrayed surface of imprinted static information, such as geographical details, a cathode-ray means to produce on the surface thereof visible images, tracks and/or intelligible data, such as alphanumeric or symbolic characters.

In the prior art there are many common geographical displays, such as globes and flat screens using natural or directed lighting to produce global situation understanding. These displays are well known to those familiar in the art of global display techniques. The present invention is a spatial analog allowing accurate plan-positional (latitude and longitude) display of information on a continuous, curved surface which may be representative of the surface of the earth, for instance.

The present invention provides a transparent evacuated envelope in the form of a spherical, or at least a partly spherical, cathode-ray tube from one to thirty feet in diameter. The envelope of the cathode-ray tube has imprinted thereon a desired portray, such as geographical details (i.e., land masses, etc.). Further, the inside surface of the cathode-ray tube envelope has thereon a coating, such as a phosphor, which can be excited to emit visible light by controllable exciter means, such as electron guns, which are able to selectively excite any point of the phosphor coating, in accordance with applied information.

An object of the present invention is to provide a cathode-ray display device in the form of a full or partial sphere which has particular utility for military and space applications.

Another object of the present invention is to provide a system of exciters, such as electron guns, that are so positioned inside such a cathode-ray display device to have full access to the inside surface of the spherical or partly spherical surface thereof.

A further object of the present invention is to provide a display device that can be positioned by a remotely controlled gimbal arrangement with respect to three mutually-perpendicular axes.

The present invention is of particular utility in providing a direct view cathode-ray display in the shape of a globe representing the earth. The requirements of many different global functions may require global situation understanding. For example, these functions include the air defense of our country which must maintain air sur-

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veillance of aircraft and missile activity throughout the world; satellite defense systems which require monitoring of all satellite activities regardless of altitude; civilian space functionaries who require adequate safety and control for a complete understanding of global situations; weather technologists who prefer or require a more nearly accurate picture of a global weather situation for long range forecasting; and other functions which may be improved or enhanced by a direct view display of an entire global situation.

Further objects and advantages of the invention will become apparent as the following description proceeds, and the features of novelty which characterize the invention will be pointed out with particularity in the claims annexed to and forming a part of this specification.

For a better understanding of the invention, reference may be had to the accompanying drawing, in which:

FIG. 1 discloses a first preferred embodiment of the present invention;

FIG. 2 discloses a second preferred embodiment of the present invention; and

FIG. 3 discloses a third preferred embodiment of the present invention.

In FIG. 1 of the drawing, the numeral 10 indicates an evacuated envelope in the shape of a globe, on the surface of which is dynamically portrayed events, occurrences, and/or situations necessary for the observer, or observers, to monitor against a static imprint of a map of the earth. The globe 10 is supported by a gimbal arrangement 12 to provide the desired slant or tilt of globe 10 for any particular situation understanding, and gimbal arrangement 12 provides the pivots 14 and 16 for the rotation of globe 10 to simulate the planetary rotation of the earth on its axis. Open-ended hollow column 18, axially oriented with respect to the north-south axes of globe 10, provides means for supporting exciter means 20 in the center of evacuated globe 10, and also provides a duct therein for external electrical connections from exciter means 20. The inside surface of globe 10 is coated with a photo-emissive phosphor coating 22. Exciter means 20 comprises a plurality of electron guns 24 so positioned on column 18 in the center of globe 10 that every individual point on the surface of globe 10 is within the field of at least one of the guns 24.

The open ends of hollow column 18 at the north and south poles of globe 10 are provided with a molded receptacle 26 and 28, respectively, with a bearing detent to accept pivots 14 and 16 of gimbal 12.

Although not forming a part of the invention, as is well known in the art, the input data to the electron guns 24 of the exciter means 20 can be obtained from a programmed computer. The electronic system for this display and the firing and scanning of the electron guns 24 would be capable of showing many orbital tracks at the same time on the entire inside surface of globe 10. Each of these tracks could be identified with a group of alphanumeric characters and symbols which would remain with the vehicle track so that the observer would be aware, at all times, of the information applicable to that object. In order to accomplish this, the video signals applied to the electron gun 44 control grid would always be synchronized with respect to both the instantaneous latitudinal and longitudinal positioning of the various respective electron beams.

In FIG. 2 of the drawing, the evacuated envelope in the shape of a globe 10' and exciter means 20' is essentially the same as described in FIG. 1, differing therefrom only in that the globe 10' is provided an open-end hollow column 18' which is attached solely to the south pole of the globe 10' and in that the entire globe assembly 34 is seated on a rotatable pedestal 36. This makes it possible to rotate by means of motor drive mechanism

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38 coupled to pedestal 36, the entire globe assembly 34 to simulate the rotation of the earth.

In FIG. 3 of the drawing there is shown a cathode-ray tube having a partly spherical evacuated envelope 40. On the partly spherical surface of envelope 40 is dynamically portrayed events against a static imprint of a desired portray, such as the northern hemisphere of the earth, for instance. The spherical portion of the inside surface of the envelope 40 is coated with a photo-emissive phosphor coating 22'. The remaining portion of the evacuated envelope forming the cylinder walls is coated with an aquadag coating 42.

In the center of the partly spherical cathode-ray tube formed by envelope 40 is an electron gun 44 which is positioned at a 45° angle and is supported by a rotatable flywheel 46. Flywheel 46 comprises a counterweight 48 and a set of slip rings with brush mount 50. The slip rings with brush mount provide means for the electrical connections from the revolving electron gun 44 to the external means which provide the desired computer data to the electron gun 44. The deflection yoke 52 of electron gun 44 provides deflection in one plane only. This deflection is through the angle θ ; therefore, latitudinal positioning of data in the display is directly related to θ .

Longitudinal scanning is achieved by the motor drive 54 which rotates the electron gun 44 at a constant angular velocity. During each full rotation of the electron gun 44, the entire static print, such as the northern hemisphere, is scanned. The video signal applied to the electron gun 44 control grid is synchronized with respect to both the instantaneous latitudinal and longitudinal positioning of the electron beam.

While there has been shown and described a specific embodiment of the invention, other modifications will readily occur to those skilled in the art. It is not, therefore, desired that this invention be limited to the specific arrangement shown and described, and it is intended in the appended claims to cover all modifications within the spirit and scope of the invention.

What is claimed is:

1. A dynamic direct view cathode-ray display device comprising a transparent envelope having a first area of hemispherical shape and a second cylindrical area integral with said first area which closes one end thereof, and a base member closing the other end of said second area,

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a first coating capable of emitting light in response to irradiation covering the entire surface of said first area, and electron gun means mounted on said base member within said envelope for rotation with respect to said envelope about the center axis of said cylindrical second area for selectively irradiating any point of said first coating.

2. The device defined in claim 1 further including a second opaque coating covering the entire surface of said second area, said first area having static information imprinted thereon.

3. The device defined in claim 1 wherein said electron gun means includes beam generating and projecting means for projecting a beam of electrons on a line co-extensive with the axis thereof, said axis of said beam generating and projecting means being disposed at a 45° angle to the axis of said cylindrical second area of said envelope.

4. The device defined in claim 3 wherein said electron gun means further includes beam deflection means for deflecting said electron beam in a plane including the axes of both said cylindrical second area of said envelope and said beam generating and projecting means.

5. The device defined in claim 4 wherein said beam deflection means has a center of deflection at the point of intersection of said axis of said cylindrical second area of said envelope and a plane perpendicular thereto passing through the points of juncture between said first and second areas of said envelope.

6. The device defined in claim 2 wherein said first area represents a portion of the earth or other heavenly body, and wherein said static information includes a map of the topography of said portion.

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ROBERT L. GRIFFIN, *Primary Examiner*.

R. L. RICHARDSON, *Assistant Examiner*.