United States Patent

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[73] Assignee **Trans-World Display Corporation**

[54] **ROTATABLE DISPLAY DEVICE**
8 Claims, 7 Drawing Figs.

[52] **U.S. Cl.** **40/33**
[51] **Int. Cl.** **G09f 11/02**
[50] **Field of Search** 40/33, 34, 39, 68, 218

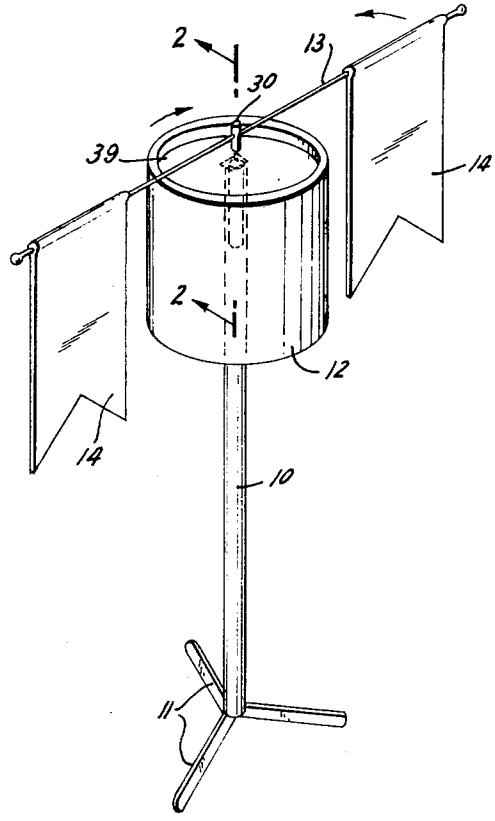
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Assistant Examiner—Richard Carter
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ABSTRACT: A display device including a stationary bracket provided with one or more openings each loosely accommodating a spherical ball. Two rotatable plates, on opposite sides of the bracket, sandwich the balls between them. Each plate carries a display member. A motor rotates one of the plates and its display member in one direction, and the balls transmit the rotation to the other plate and display member, so that the latter rotate in the opposite direction.



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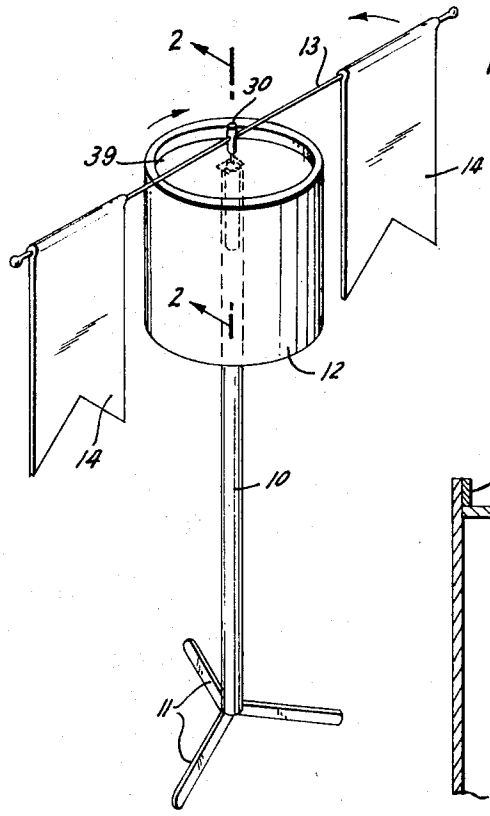
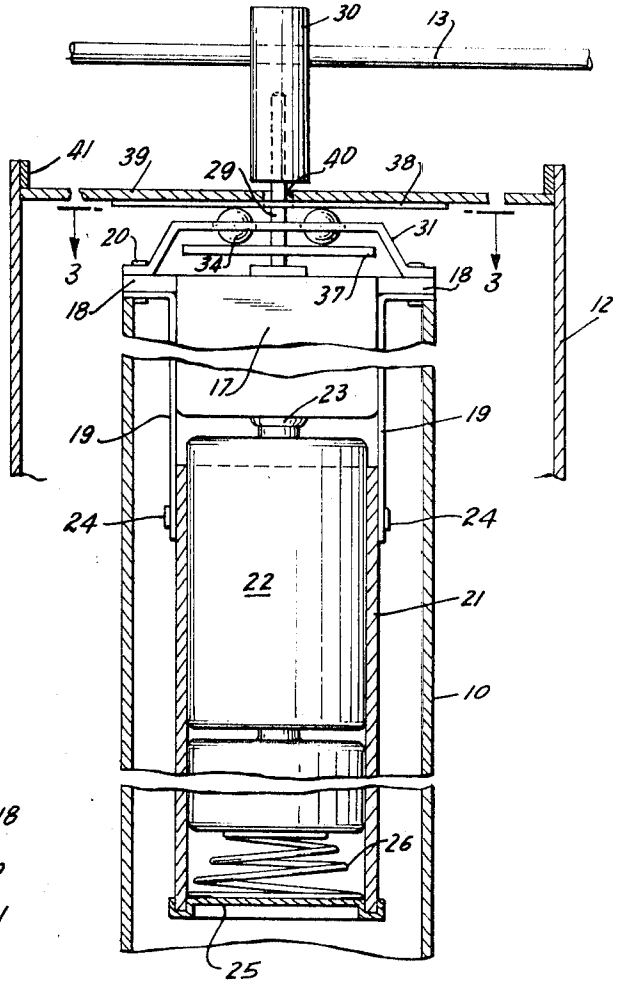


FIG. 1

FIG. 2



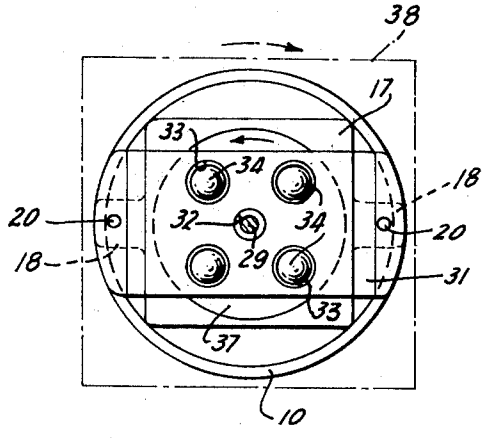


FIG. 3

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FIG. 4

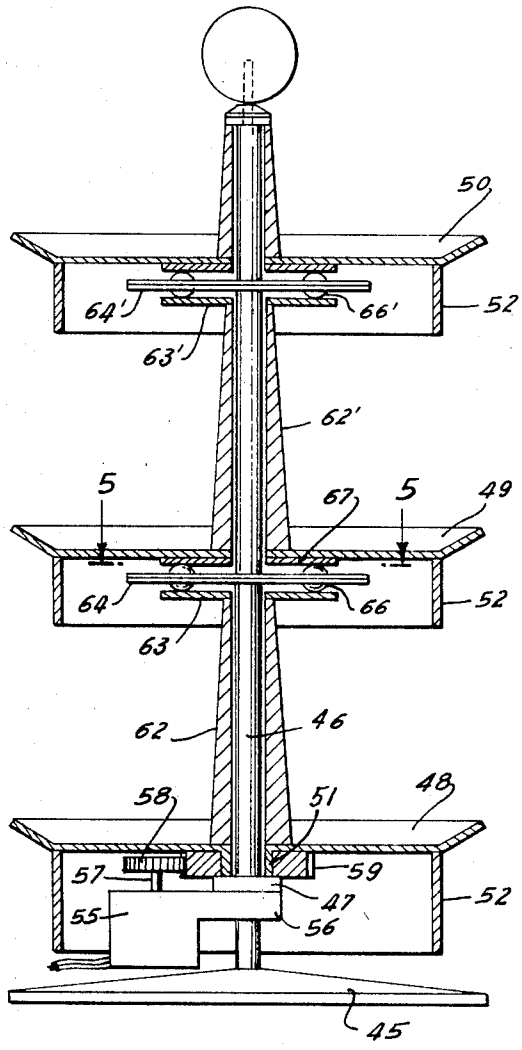


FIG. 7

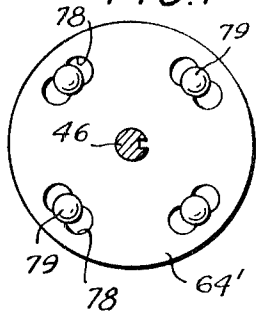


FIG. 5

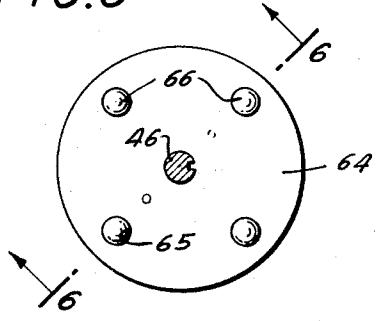
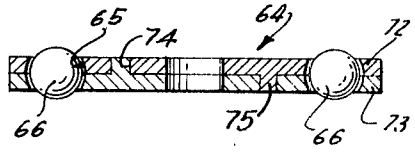


FIG. 6



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ROTATABLE DISPLAY DEVICE

This invention relates to display devices of the type in which at least two separate display members are rotated in opposite directions about a single axis.

Displays of this type are known in which a plate bearing one display member is rotated by a motor, and a wheel, rotatable about an axis perpendicular to the axis of rotation of the plate, rests on the plate and is rotated by it. A second display member, rotatable about the same axis as the plate, engages the wheel and is rotated by the wheel in a direction opposite to the direction of rotation of the plate.

A serious problem presented by this conventional arrangement is that movement of the wheel along a circular path on the plate causes a great deal of wear on these parts which limits the useful life of the display. Additionally, the resistance which the wheel encounters as it moves in a path of constantly changing direction with respect to the plate places a strain on the motor, which limits its life, or requires the use of a larger more expensive motor.

It is an object of this invention to overcome these problems by providing a display device of the type mentioned in which wear of the reverse motion transmitting means is greatly minimized, and which permits employment of a small motor without endangering its useful life.

It is another object of the invention to provide such a device in which the reverse motion transmitting means is very compact and easily assembled with the remainder of the display.

Additional objects and features of the invention will be apparent from the following detailed description in which reference is made to the accompanying drawings.

In the drawings:

FIG. 1 is a perspective view of one embodiment of a display device incorporating the present invention;

FIG. 2 is a fragmentary, vertical cross-sectional view, on an enlarged scale, taken on line 2–2 of FIG. 1;

FIG. 3 is a horizontal cross-sectional view taken on line 3–3 of FIG. 2;

FIG. 4 is a longitudinal cross-sectional view of another embodiment of a display device incorporating this invention;

FIG. 5 is a horizontal cross-sectional view taken on line 5–5 of FIG. 4;

FIG. 6 is a cross-sectional view taken on line 6–6 of FIG. 5; and

FIG. 7 is a view similar to FIG. 5 showing an alternative form of ball-carrying bracket.

The illustrative embodiment of the present invention shown in FIGS. 1—3 is a so-called pole display including a vertical hollow pole 10 supported in upright position by legs 11. A cylindrical display member 12, which may bear advertising matter on its outer surface, and a horizontal rod 13, carrying display members 14, shown in the form of pennants, are supported at the upper end of the pole 10 for rotation about the longitudinal axis of the pole. The arrangement is such that when the device is in operation, the cylinder 12 rotates in one direction, and the rod 13 and pennants 14 rotate in the opposite direction, as indicated by the arcuate arrows in FIG. 1.

Referring to FIGS. 2 and 3, showing the region of the upper end of pole 10, it will be seen that the motor 17, for moving the display members, is small enough to fit within the hollow pole 10. The motor casing is formed with integral ears 18 engaging the upper edge of the pole thereby supporting the motor 17 within the upper end portion of the pole. An L-shaped strap 19 is secured at its upper end to the lower face of each ear 18, by a rivet 20, and at its lower end by rivets 24, to a tube 21 housing batteries 22 for energizing the motor 17. The interior surface of tube 21 bears a metal coating (not shown) for completing the energizing circuit, which includes the batteries, terminal 23 of motor 17, a metal cover plate (not shown) of the motor housing, rivets 20, straps 19, rivets 24, the metal coating, the metal bottom wall 25 of tube 21, and spring 26.

Fixed to, and rotatable with, the motor shaft 29 is a hub 30 through which the rod 13 passes. It will be appreciated therefore, that upon rotation of the motor shaft 29, the rod 13, and the pennants it carries are rotated in the direction of rotation of the shaft.

Mounted on the upper face of each ear 18 of the motor casing, by means of the rivets 20, is a bracket 31 extending across the top of motor 17. In the form shown, the bracket is a strip of sheet metal deformed so that its central region is spaced above the top of motor 17. The bracket is provided with a central hole 32 through which the motor shaft 29 passes, the hole 32 being larger than the diameter of the shaft so that the bracket, which remains stationary, does not interfere with rotation of the shaft.

The central region of the bracket is also provided with four openings 33, and a spherical ball 34, preferably of metal, is loosely accommodated within each opening. Due to their loose fit, the balls are free to rotate in any direction while remaining within their respective openings. Although four balls 34 are shown in this example, any desired number may be used. However, to avoid unbalance, at least three balls are preferably employed.

Fixed to, and rotatable with, the motor shaft, at a location beneath the bracket 31, is a circular plate 37, preferably of metal, upon which the balls 34 rest. A second plate 38 having a square shape in the present illustration, and also preferably of metal, rests on the balls 34, so that the balls in effect are sandwiched between the plates 37 and 38. Plate 38, like bracket 31, has a central hole through which the motor shaft 29 passes, the hole being larger than the diameter of the shaft so the plate 38 can rotate with respect to the shaft.

The cylindrical display member 12 is carried by the plate 38 so that the two rotate together. In the present example, this is accomplished by furnishing a circular disc 39 fixed to the plate 38, the disc having an enlarged central hole 40 through which motor shaft 29 passes. A narrow strip 41 is secured along the upper margin of the inner face of cylinder 12, the lower edge of strip serving as a ledge which engages the upper edge of disc 39 and thereby supports the cylinder 12 on the disc for rotation with the latter.

When motor 17 is energized causing rotation of shaft 29, rod 13 and pennants 14 rotate in one direction, as mentioned above. Plate 37 rotates in the same direction, causing the balls 34 to rotate. Rotation of balls 34 in turn causes rotation of plate 38, but since the upper portion of each ball, engaging plate 38, is moving in a linear direction opposite to the linear direction of the lower portion of each ball engaging plate 37, plate 38 is rotated in a direction opposite to the direction of rotation of plate 37. Consequently, the display cylinder 12, carried by plate 38, rotates in a direction opposite to that of the rod 13.

Since the balls 34 are not constrained to rotate about any particular axis, they tend to follow a path of least resistance, and thus the arrangement described above experiences much less wear, for a given period of use, than conventional dual rotation displays which employ wheels to transmit motion to the counter rotation member. Furthermore, the following components may be preassembled as a unit: motor 17, batteries 22 and tube 21, bracket 31 and balls 34, plates 37 and 38, and hub 30 (the hub being removable to allow placement of the disc 39 as shown), so that when the display is to be erected, the preassembled unit is simply dropped into the upper end of the pole and the display members 12 and 13, 14 assembled with it.

FIGS. 4—6 show an alternative embodiment of the present invention. A base 45 supports a stationary upright rod 46 to which a thrust bearing 47 is fixed. A series of trays 48, 49, and 50, arranged one above the other, encircle the rod 46 and are rotatable about the longitudinal axis of the rod. These trays may be used to hold merchandise for display. Each tray carries a depending skirt 52 to shield the motion producing means from view. The lowermost tray 48 presents a depending collar 51 resting on the bearing 47.

The display device is powered by an electric motor 55 mounted on the rod 46 by a lateral extension 56 of the motor casing. The motor shaft 57 carries a pinion 58 meshing with a gear 59 surrounding collar 51 and fixed to the tray 48. Thus, upon energization of motor 55, tray 48 is caused to rotate.

A tubular member 62, fixed to and rotatable with tray 48, surrounds rod 46 and carries a plate 63 at its upper end, whereby plate 63 rotates with, and in the same direction, as tray 48. At a location above plate 63, a circular bracket 64 surrounds rod 46. As illustrated in FIG. 5, the central hole in bracket 64 presents a key slidably arranged in a longitudinal keyway in rod 46. Thus, bracket 64 is prevented from rotating with respect to rod 46, but is free to slide along the length of the rod. The bracket has four openings 65 within each of which a ball 66 is loosely accommodated, the balls resting upon plate 63. Since the bracket 64 is slidable along rod 46, it is free to find a location in which all the balls 66 it carries come to rest on plate 63. Fixed to the lower surface of tray 49 is a second plate 67 resting on balls 66. Thus, the balls 66 serve to support the tray 49, and the skirt 52 and plate 67 secured to it. As described above, with reference to FIGS. 1—3, rotation of plate 63 in one direction causes rotation of plate 67, and tray 49, in the opposite direction, via balls 66.

A tubular member 62′ carrying a plate 63′ at its upper end, rotates with tray 49 and, via balls 66′ located within fixed bracket 64′, causes rotation of tray 60 in the same direction as tray 48 but in a direction opposite to that of tray 49. Obviously, as many trays as desired may be stacked in this way, and each will rotate in a direction opposite to the direction of rotation of the tray immediately above and/or below it.

FIG. 6 illustrates a form of construction of bracket 64 permitting the bracket and balls 66 to be preassembled without danger of the balls falling out of the bracket. The bracket is made of two, preferably plastic, discs 72 and 73. In addition to a center hole for accommodating rod 46, each disc has an eccentric hole 74 into which an integral pin 75 on the other disc is press fit, thereby holding the discs together. The slides of each opening 65 in each disc taper outwardly, so that although the diameter of the opening exceeds the diameter of the ball 66 along the centerline of the bracket, to permit free rotation of the ball, the diameter of each opening is smaller than the diameter of the ball at each outer face of the bracket, thereby preventing the ball from dropping out of the opening. It should be mentioned that bracket 64 may be formed of a single piece of plastic, and the balls 66 forced into their respective openings 65, the inherent resilience of the plastic permitting the balls to pass through the relatively small diameter of the opening at the outer face of the bracket.

The openings 65 need not necessarily be circular, as long as a portion of its perimeter has the relationship to the ball shown in FIG. 6. For example, FIG. 7 shows a bracket 64′ having an alternative form of openings 78 for accommodating balls 79. This arrangement is highly advantageous since the frictional resistance encountered by each ball as it rotates is greatly minimized, thus reducing the wear on the ball and bracket and extending the life of the display. Each ball rotates generally about an axis coincident with a radial line drawn from rod 46 through the ball, and it will be noted that in the embodiment of FIG. 7, bracket 64′ engages each ball 79 only in the region of its axis of rotation. Thus, the portion of each ball having the greatest relative movement with respect to the bracket does not engage the bracket.

The invention has been shown and described in preferred form only and by way of example, and it is understood, therefore, that many variations may be made in the invention which will still be comprised within its spirit.

What I claim is:

1. A display device comprising:
a stationary support,
a bracket fixed with respect to said support, said bracket having at least one opening,
a spherical ball loosely accommodated within said opening,
first and second plates on opposite sides of said bracket and rotatable with respect to said support, said plates sandwiching said ball between them,
first and second display members rotatable with said first and second plates, respectively, and
a motor for rotating said first plate and first display member in the same direction, rotation of said first plate being transmitted via said ball to said second plate,
whereby said first and second display members rotate in opposite directions.

2. A display device as defined in claim 1 wherein said first and second plates are arranged below and above said bracket, respectively, said ball rests by gravity on said first plate, and said second plate rests by gravity on said ball.

3. A display device as defined in claim 2 wherein said plates are arranged in parallel horizontal planes.

4. A display device as defined in claim 1 wherein said support includes a vertical pole, said motor and bracket being mounted to the upper end of said pole, said motor having a vertical shaft, said first plate and display member being fixed to said shaft, and said second plate and display member surrounding but rotatable with respect to said shaft.

5. A display device as defined in claim 1 wherein said support includes a vertical pole, said plates and display members surrounding and being rotatable with respect to said pole, said first plate being spaced above said first display member, and a tubular member surrounding said pole and joining said first display member and plate.

6. A display device as defined in claim 1 wherein said bracket comprises a sheet metal element provided with at least one hole, the diameter of said hole being slightly larger than the diameter of said ball.

7. A display device as defined in claim 1 wherein said bracket includes a pair of discs, means for holding said discs in face-to-face relation, and each disc having an opening in registry with an opening in the other disc, at least a portion of the sides of each opening tapering outwardly, and the exterior diameter of each opening being smaller than the diameter of said ball, so that said ball cannot drop out of said opening.

8. A display device as defined in claim 1 wherein said bracket includes a flat element provided with at least one non-circular opening, said opening being elongated in a direction generally perpendicular to the axis about which said ball rotates.