

March 28, 1944.

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2,345,147

ROTATABLE DISPLAY SUPPORT

Filed July 23, 1943

Fig. 1.

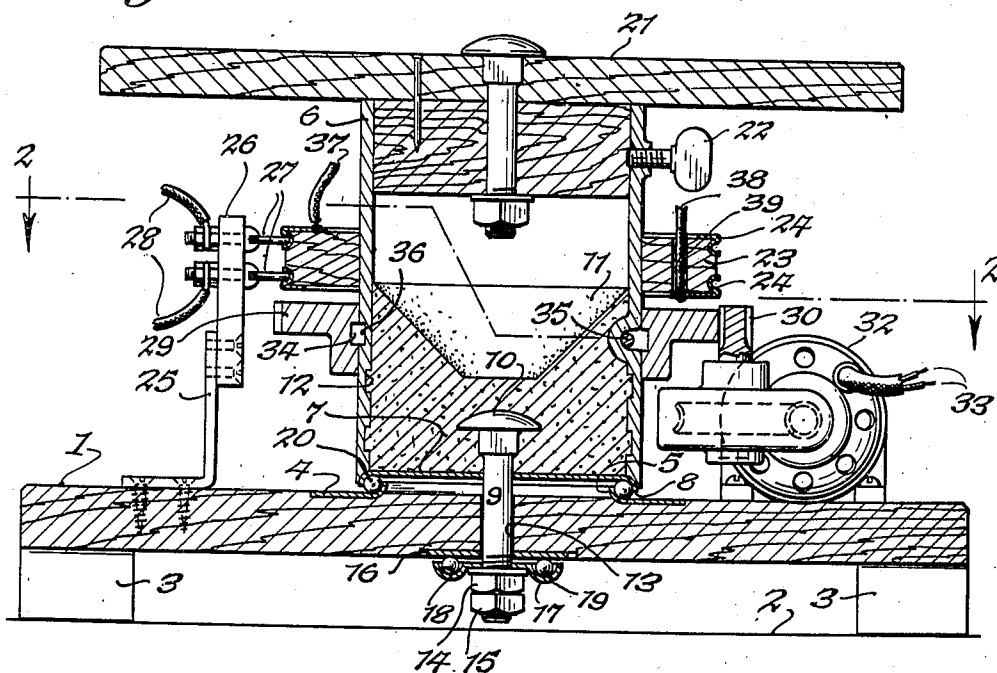
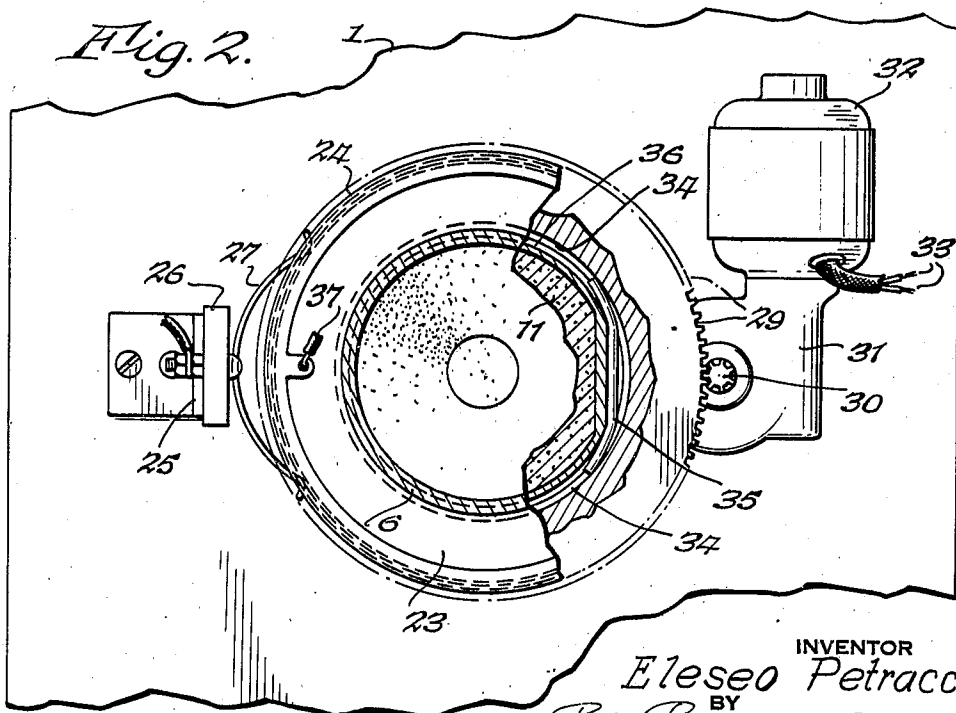


Fig. 2.



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2,345,147

ROTATABLE DISPLAY SUPPORT

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Application July 23, 1943, Serial No. 495,861

10 Claims. (Cl. 211-1.6)

This invention relates to display devices, and particularly to those which rotate an object to be displayed, such as a Christmas tree or a platform on which one or more objects are mounted for slow rotation for observation by the public.

An object of this invention is to provide an improved display device of this type, with which a Christmas tree or similar device having a supporting post may be removably mounted in an upright position or replaced by a platform which is rotated in a similar manner; with which electric lights or devices on the tree or platform may be supplied with current in a simple manner; with which the tree or platform may be rotated independently of the rotating means, which will occupy a minimum of vertical and horizontal space and at the same time will have stable equilibrium, and which will be relatively simple, trouble free, easily constructed and inexpensive.

Another object of the invention is to provide an improved display device of this type, which will utilize simple and inexpensive ball bearings or anti-friction bearings; which will require a minimum of accurate machine work; which may be easily assembled; which will require a minimum of power to operate; and which will occupy a minimum of height and horizontal space.

Other objects and advantages will be apparent from the following description of one embodiment of the invention, and the novel features will be particularly pointed out hereinafter in connection with the appended claims.

In the accompanying drawing:

Fig. 1 is a transverse sectional elevation of a device constructed in accordance with this invention, and with a platform removably supported in the upper end of the rotating standard but which may be removed to enable the trunk of a Christmas tree to be supported; and

Fig. 2 is a sectional plan of the same, the section being taken approximately along the line 2-2 of Fig. 1.

In the illustrated embodiment of the invention, a base element 1 is formed of a flat plate, spaced slightly from a surface 2 on which it may be resting in any suitable manner, such as by short feet 3, or the base element may be a thicker plate with a recess formed in its central zone opening from its lower face for a purpose which will appear shortly. Secured upon the upper face of the base element, is an annular, metallic bearing plate or member 4 having an upstanding peripheral flange 5 along its inner periphery. A tube 6 is disposed in upright position on the base element, and this tube is closed at its lower end by a

bearing plate 7 which has, at its periphery, a downwardly turned flange 8. The flange 8 has a greater diameter than the flange 5 and telescopes slightly over it. Passing through the bearing plate 7 is a rod or bolt 9, having a head 10 within the tube spaced above the plate 7, and the lower portion of the tube 6 is filled with a hardened plastic material such as cement or other suitable filler material 11.

The inner periphery of the tube 6 is preferably provided with undercut portions or grooves 12, so that the filler 11 will engage in the grooves or undercut portions or recesses 12 to anchor the filler against turning. The head 10 and the portion of the shank of rod 9 immediately below the head are non-circular so that the tube and the bolt 9 will be firmly united for rotation together. The shank of the bolt 9 extends downwardly loosely through the opening of member 4 and an aperture 13 in the base element 1, and at its lower end carries a nut 14 and lock nut 15, which are threaded thereon.

On the underface of the base element is a flat bearing plate 16 with an aperture through which the rod or bolt 9 loosely extends, and slidable and rotatable on the bolt or rod 9 below the plate 16 is a bearing element 17 which has in its upper face an annular groove 18. The groove is concentric with the opening in that bearing element through which the bolt or rod 9 extends, and within the groove 18 are a plurality of rolling bearing elements 19, such as ball bearings. These ball bearings are confined in position by the groove 18, and they provide a rolling bearing against the under flat face of the plate 16. Adjustment of the nuts 14 and 15 will press the bearing element 17 and the ball bearings carried thereby against the underface of the bearing plate 16 and draw bearing plate 7 towards bearing 4 with the desired firmness. Disposed between the flanges 5 and 8 are rolling bearing elements 20, such as ball bearings, which are held in rolling position by the flanges which serve the function of a bearing race. These bearing elements 20 function as an end-thrust bearing for the tube 6 and also as a radial bearing for rotatably supporting the tube 6.

The upper end of the tube 6 is open so as to receive an object 21 to be rotatably supported or displayed. Such an object may, for example, be a platform or a Christmas tree. The platform has a depending boss of a size to be received and clamped in the open upper end of the tube 6 in any suitable manner, such as by a set screw 22, or in case of a Christmas tree, the lower end

of the trunk of the tree is received in the open end of the tube 6 and secured therein by tightening of the set screw 22. The filler 11 may have a somewhat conical or concave recess in its upper face to enable the lower end of the trunk of a Christmas tree to be received therein to a substantial depth. One may remove the object 21, which is shown as a platform, and replace it by any other object, such as the trunk of a Christmas tree or any upright standard.

Secured on the outer periphery of the tube 6 is an annular block 23 of insulating material, such as wood, hard rubber, or any insulating plastic, and this annular block will rotate with the tube 6. An annular ring 24 of metal is provided upon each outer corner edge of the block 23, so as to function as a collecting ring, and these rings are insulated from each other by the material of block 23. Supported on a standard 25 carried by the upper face of the base element 1 is a block 26 of insulating material which mounts brushes 27 that bear upon the collector rings 24 so that each brush will provide an electrical connection to a related collector ring while the block 23 with the rings thereon is rotating with the tube 6. Circuit wires 28 may be connected to the brushes 27. Slidably mounted upon the periphery of the tube 6, preferably below the block 23, is a gear or driving element 29, which meshes with a pinion or power operated element 30.

The element 30 is driven through a speed reduction device 31 from a motor 32, which is mounted on the base element 1 and supplied by current by wires 33 under the control of a suitable switch (not shown), so that when the motor 32 rotates at its normal speed, it will slowly rotate the tube 6. In the driving connection from the motor to the tube 6, I provide a frictional or slip connection, so that if the object carried by the tube 6 is too great a weight for the motor to turn, or is held or blocked from turning, the connection will slip and thus avoid burning out of the motor through overload thereof. This connection also enables one to turn the platform 21 or other device supported by the tube 6 in either direction independently of the rotation of the motor, either while the motor is running or while the motor is inactive.

In the illustrated embodiment of the invention, this slip connection is preferably provided between the driving element 29 and the periphery of the tube 6. For this purpose, the bearing surface of the driving element or gear 29 is provided with a shallow annular groove 34, and in this groove is a rod or bar 35 of resilient material, such as a rod of spring brass or steel, which is flexed in putting it into the recess by its engagement with the periphery of the tube 6. This flexing pressure provides a frictional drive between the element 29 and the tube 6.

The gear or driving element 29 should be confined against endwise movement along the tube 6, and in the particular example, the periphery of the tube 6 is provided with a shallow recess 36 aligned with the groove 34 into which the spring bar 35 also engages sufficiently to normally prevent movement of the gear or element 29 endwise along the tube 6. The recess 34 is sufficiently shallow or provided with bevel side walls so that by applying sufficient pressure to the gear or element 9 in a direction endwise of the tube 6, the bar 35 will spring and allow the gear or element 29 to be moved along the tube 6 and be disengaged therefrom. The gear 29 is ap-

plied to the tube by a similar but reverse movement.

The brushes 27 are preferably spring arms extending in opposite directions from their anchorage to the post 25, and riding in grooves in the peripheral edge or surface of the ring 24. A wire 37 is connected to the upper ring 24 and another wire 38 is similarly connected to the lower ring 24. The block 23 is provided with an aperture 39 from face to face through which the wire 38 may pass to a position above the block 23. These wires 37 and 38 may be connected to any illuminating element or other electrical device carried by the platform 21, or by the tree or display standard mounted in the tube 6. In the case of a Christmas tree, the lights of the tree may be connected to the wires 37 and 38, and thus placed in communication with the wires 28, so that current will be supplied continuously to the tree lights while the tree rotates.

It is believed that the operation of the device will be clear from the foregoing description, but will be briefly explained. Assuming that the platform 21 is secured in the upper end of the tube 6 by the set screw 22, the wires 28 are connected to a source of current and the wires 37 and 38 are connected to any electrical display device that may be mounted on the platform 21. The wires 33 of motor 32 are connected to any source of current, and the motor then rotates through the speed reduction device 31 which drives the pinion 30 at a relatively low rate. The pinion 30 in turn meshes with the relatively large gear or drive element 29 and thereby slowly rotates the element 29. This element through the spring bar 35 frictionally drives the tube 6 in a rotary direction and thus slowly rotates the platform 21. If the platform is held against rotation, the frictional drive through the bar 35 will avoid stalling the motor, or if one desired to turn the platform 21 independently of the rotation by the motor and while the motor is operating, this may also be done without danger to the motor. As soon as the platform is released, it will be again turned slowly by the motor. A tree or any other object received in the open upper end of tube 6 will be similarly rotated.

It will be noted that the bearings between the tube 6 and the base element are approximately concentric to rod or bolt 9 and occupy a relatively small vertical space and also relatively small horizontal space, yet a very stable, rotatable support is provided for the tube 6. The ball bearing between the flanges 5 and 8 provides for the thrust support of the tube 6 and the rod carried thereby, and the flanges confine the ball bearings in position. The flanges 5 and 8 preferably makes slightly more than 90 degree angles with the faces of the plates on which they are formed, and with such an arrangement, they provide beveled surfaces oblique to the longitudinal axis of the tube 6 for the ball bearings 20, so that a slight vertical movement of the tube 6 will cause the proper contact between the ball bearings and the plates 4 and 7 without looseness or play. This makes it unnecessary to accurately position or form the flanges 5 and 8.

The bolt or rod 9 extends loosely through the aperture 13 in the base element, and while the bolt 9 rotates with tube 6, it does not have a bearing in the aperture 13 of the base element. Since the plate 16 is flat, the bolt 9 may be shifted sidewise in the aperture 13 which makes unnecessary any accurate machining operations in order to aline the bearings on the upper and

lower faces of the base element. The bearing on the lower face of the base element effectively resists tipping of the tube 6 sidewise, yet such tipping is resisted only by a rolling bearing which does not cause any material resistance to rotation, and by adjustment of the nuts 14 and 15 the tube 6 will be anchored to the base element without any clearance play that would allow lateral tipping or shifting of any object carried by the tube 6. There are no parts which require very accurate machining, yet one obtains a very accurate and durable bearing support for the tube 6, without play, which requires a minimum of power to turn. The entire device is relatively small in vertical dimensions as well as horizontal dimensions, and all parts are simple, inexpensive and easily made.

It will be understood that various changes in the details, materials and arrangements of parts, which have been herein described and illustrated in order to explain the nature of the invention, may be made by those skilled in the art within the principle and scope of the invention as expressed in the appended claims.

I claim as my invention:

1. A display device comprising a base element, an annular, metal bearing plate disposed flat against one face of said base element and having along its inner edge an annular flange extending away from said base element, a rotatable member abutting endwise towards said base element and having a bearing plate on its end surface adjacent said element, said last bearing plate having a circular peripheral flange extending towards said element and of a diameter greater than the diameter across said first mentioned flange, but telescoping thereover, an anti-friction bearing confined between said flanges, a rod secured to said member approximately concentrically of said flanges and extending through said base element to the opposite face thereof, a flat bearing plate on said opposite face of said base element and through which said rod extends, a bearing element slidable on the free end of said rod towards and from said flat bearing plate and having an annular groove in its face towards said flat bearing plate approximately concentric with said rod, an anti-friction bearing confined in said groove and bearing on said flat plate, means adjustable endwise on the free end of said rod to prevent withdrawal of said rod from said base element and clamp said bearing element and said rolling bearing against said flat bearing plate, and means mounted on said base element and drivingly connected to said rotatable member to rotate it.

2. The device substantially as set forth in claim 1, and said rotatable member comprising a tube carrying at one end its said bearing plate, with said rod passing through that bearing plate into said tube and there having an abutment, and a hardened cast mass secured in said tube and in which said end of said rod within the tube is anchored.

3. A display device comprising a base element, a tube upstanding from a face of said element and supported therefrom solely at its bottom end for rotation about an upright axis, said tube being open at its upper end to receive and support an object to be displayed, means carried by the tube for securing said object removably in the upper end of said tube, a driving member rotatably carried by said tube peripherally thereof, said tube and member each having on their abutting surfaces an annular channel, a spring fric-

tion element in said channels and providing a friction drive between said tube and member, and means carried by said base element and drivingly connected to said driving member.

4. A display device comprising a base having a central portion spaced from a surface on which it is supported, a tube in upright position and spaced from the upper face of said base, said tube being open at its upper end to receive an object to be supported, the lower end of said tube being closed and containing a hardened filler, a rod extending through the bottom of said tube and having its end within the tube anchored firmly in said filler, said base having an aperture through which said rod extends, the bottom of said tube having a downwardly turned peripheral flange approximately concentric with said rod, an annular plate secured on the upper face of said base and having an upwardly turned annular flange along its inner periphery concentric with said downwardly turned flange on said tube and within and spaced from said downwardly turned flange, an anti-friction bearing between the bottom of said tube and said annular plate and confined between said flanges for providing an end thrust and radial bearing between the tube and base, a bearing element on the lower face of said base element and through which said rod extends, another bearing element movable endwise on the lower end of said rod, an anti-friction bearing between said bearing elements, a member threaded on the lower end of said rod and adjustably clamping said bearing elements together, a driving member provided on said tube above its bottom end, and means carried by said base and drivingly connected to said driving member.

5. A device substantially as set forth in claim 4, in which said driving member is rotatable on the periphery of said tube, one of the abutting faces between said tube and driving member having an annular groove, and a spring element in said groove and under stress between said driving member and tube to provide a frictional driving connection between them.

6. A display device comprising a base having a central portion spaced from a surface on which it is supported, a tube in upright position and spaced from the upper face of said base, said tube being open at its upper end to receive an object to be supported, the lower end of said tube being closed and containing a hardened filler, a rod extending through the bottom of said tube and having its end within the tube anchored firmly in said filler, said base having an aperture through which said rod extends, the bottom of said tube having a downwardly turned peripheral flange approximately concentric with said rod, an annular plate secured on the upper face of said base and having an upwardly turned annular flange along its inner periphery concentric with said downwardly turned flange on said tube and within and spaced from said downwardly turned flange, an anti-friction bearing between the bottom of said tube and said annular plate and confined between said flanges for providing an end thrust and radial bearing between the tube and base, a bearing element on the lower face of said base element and through which said rod extends, another bearing element movable endwise on the lower end of said rod, an anti-friction bearing between said bearing elements, a member threaded on the lower end of said rod and adjustably clamping said bearing elements to-

gether, a driving member provided on said tube above its bottom end, means carried by said base and drivingly connected to said driving member, an annulus of insulating material secured on said tube above said driving member, and having annular, spaced apart rings thereon concentric to the axis of said tube, brushes carried by said base element and bearing on said annular rings, and connections from said annular rings extending upwardly from said annulus for connection to a object that may be supported on the upper end of said tube.

7. A display device comprising a base having a central portion spaced from a surface on which it is supported, a tube in upright position and disposed endwise towards the upper face of said base, said tube being open at its upper end to receive an object to be supported, the lower end of said tube being closed, a rod drivingly secured to said tube and depending therefrom, said base having an aperture through which said rod extends, the bottom of said tube having a downwardly turned peripheral flange approximately concentric with said rod, an annular plate secured on the upper face of said base and having an upwardly turned annular flange along its inner periphery concentric with said downwardly turned flange on said tube and within and spaced from said downwardly turned flange, an anti-friction bearing between the bottom of said tube and said annular plate and confined between said flanges for providing an end thrust and radial bearing between the tube and base, a bearing element on the lower face of said base element and through which said rod extends, another bearing element movable endwise on the lower end of said rod, an anti-friction bearing between said bearing elements, a member threaded on the lower end of said rod and adjustably clamping said bearing elements together, a driving member provided on said tube above its bottom end, and means carried by said base and drivingly connected to said driving member.

8. A display device comprising a base having a central portion spaced from a surface on which it is supported, a tube in upright position and endwise with respect to the upper face of said base, said tube being open at its upper end to receive an object to be supported, the lower end of said tube being closed, a rod drivingly secured to said tube and depending therefrom, said base having an aperture through which said rod extends, the bottom of said tube having a downwardly turned peripheral flange approximately concentric with said rod, an annular plate secured on the upper face of said base and having an upwardly turned annular flange along its inner periphery concentric with said downwardly turned flange on said tube and within and spaced from said downwardly turned flange, an anti-friction bearing between the bottom of said tube and said annular plate and confined between said flanges for providing an end thrust and radial bearing between the tube and base, a bearing element on the lower face of said base element and through which said rod extends, another bearing element movable endwise on the lower end of said rod, an anti-friction bearing between said bearing elements, a member threaded on the lower end of said rod and adjustably clamping said bearing elements to-

gether, a driving member provided on said tube above its bottom end, and means carried by said base and drivingly connected to said driving member, one of said bearing elements being flat in the portion engaged by said rolling bearing whereby accurate alignment of said elements with said annular plate on the upper face of the base is unnecessary.

9. A display device comprising a base, a tube disposed upright at the upper face of said base and formed at its upper end to receive and hold an object to be supported, a rod secured to the lower end of said tube and depending therefrom, said base having an aperture through which said rod depends, bearing members disposed approximately concentrically with respect to said rod, one of said members being annular with a laterally turned, circular flange along its inner periphery, the other of said members having a laterally turned, circular flange along its outer periphery, of greater diameter than the flange of said member, each of said flanges extending toward the other member to provide between them a race, a pair of bearing elements also approximately concentric with said rod, one of said elements having a flat face, the other of said elements having an annular groove facing said one element, an anti-friction bearing confined in said groove between and bearing against said elements to provide a rolling bearing between them, an anti-friction bearing in said race between said bearing members to provide a rolling bearing between said members and said flanges, said bearing elements being disposed at one face of said base and said members being disposed at the other face of said base, a nut threaded on the free end of said rod and confining said base between said bearing elements at one face thereof and said bearing members at the other face thereof, and means connected to said tube above said base for rotating it.

10. A display device comprising a base element having an aperture from face to face, a rotatable display supporting member disposed at one face of said element and having an extension passing loosely through said aperture, an abutment releasably secured on said extension and adjustable endwise thereon, said member and element having between them a pair of bearing surfaces facing each other, a bearing plate on said extension but between said element and said abutment, said plate and the face of said element opposite said member having between them another pair of bearing surfaces facing each other, one of said pairs of said surfaces having telescoping but spaced flanges forming between them a ball bearing race, balls in said race and confining said members against movement across said one face of said base element and also providing an end thrust ball bearing between those surfaces of that pair, one of the abutting faces of said other pair of bearing surfaces being formed to receive and confine between these surfaces an anti-friction bearing and an anti-friction bearing so confined between said other pair of said bearing surfaces, whereby the distance between said pairs of bearing surfaces may be small and the rotatable member held firmly against tilting with respect to its axis of rotation.