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COUNTERREVOLVING DISPLAY MECHANISM

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FIG. 1

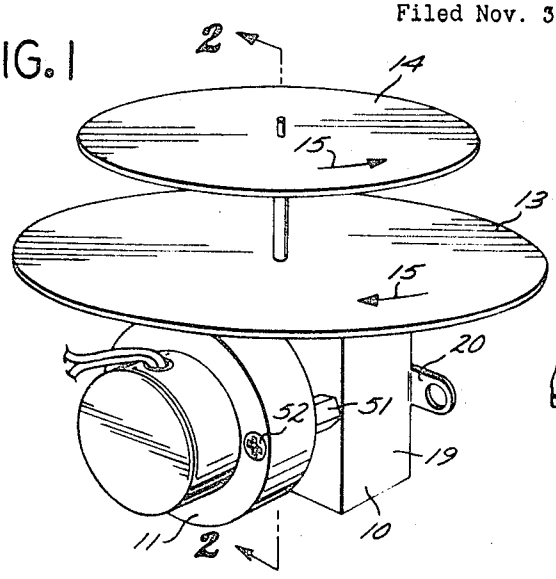


FIG. 2

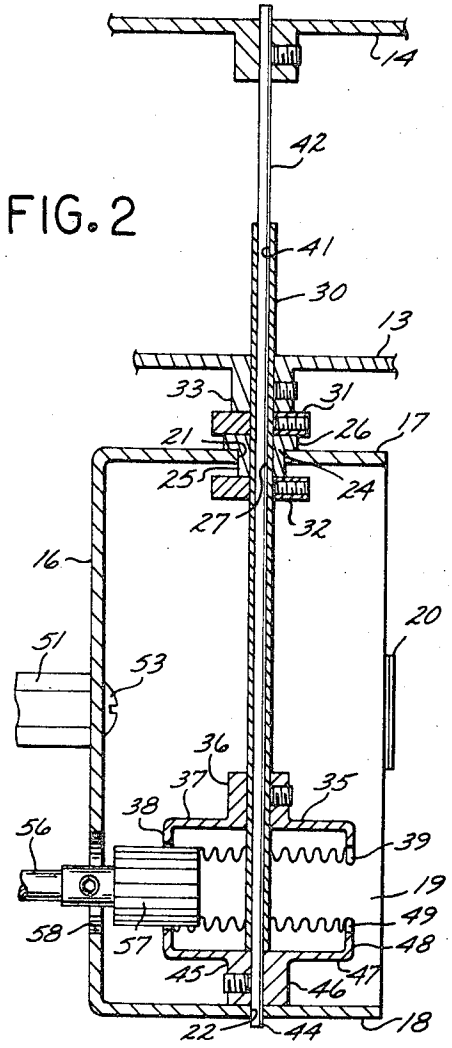
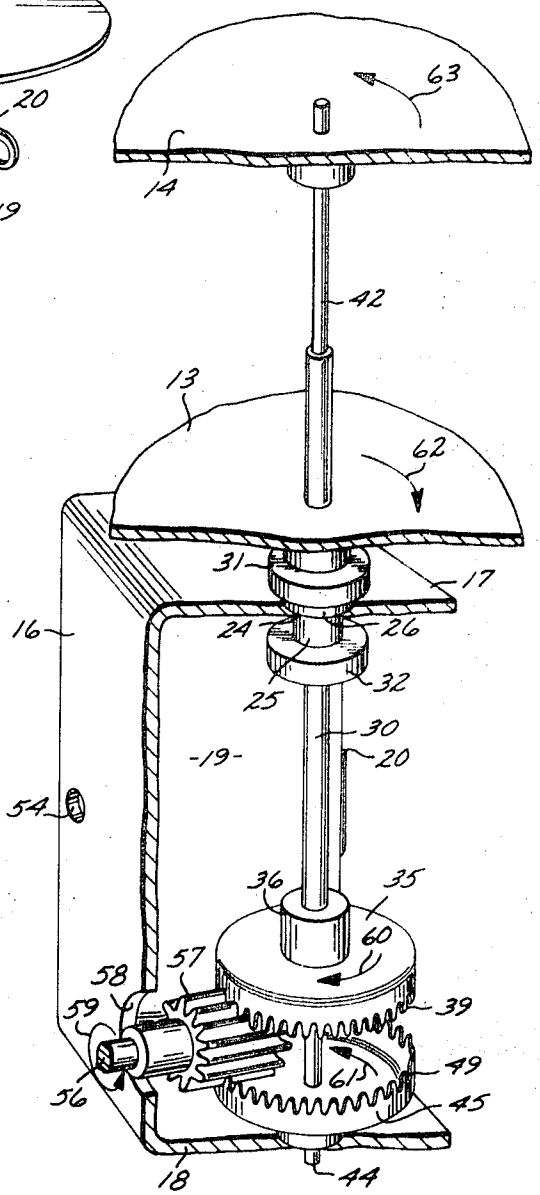


FIG. 3



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COUNTERREVOLVING DISPLAY MECHANISM

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ABSTRACT OF THE DISCLOSURE

A counterrevolving display mechanism including a first tubular shaft rotatably mounted on a frame by bearing means, and having a second shaft rotatably received within it, there being provided on said first shaft collars which hold said first shaft against upwardly or downwardly movement; said second shaft extending below the end of said first shaft and carrying a gear having a plurality of circularly disposed upwardly facing teeth; said first shaft carrying at a point near said first mentioned gear a second gear which has a plurality of circularly disposed downwardly facing teeth; and a spur gear disposed between the teeth of said first and second mentioned gears and engaging them so that rotation of said spur gear rotates said first shaft in one direction and the second shaft in the opposite direction.

This invention relates to counterrevolving display mechanisms, and more particularly to such mechanisms as can be produced at a low cost.

In the field of advertising, it has been found that it is desirable to have a display which creates its display effect by two different objects revolving in the opposite direction. For example, it might be two different platforms which rotate in opposite directions. Alternatively, two concentric cylinders—the outer of which has some transparent portion—may be used to produce an attractive effect.

A primary area of use of embodiments of the present invention is for driving in counter rotation two different elements of a display. In such use, it is essential that the drive mechanism be compact in order that it may be easily hidden. And, most importantly, it is essential that the drive mechanism be capable of being produced at a very low price.

With the foregoing in mind, it is a major object of this invention to produce a counterrevolving display mechanism of an improved type.

Another object of this invention is to produce a mechanism for driving two different elements of a display in opposite directions, which mechanism may be produced at a very low cost.

A further object of this invention is to provide a counterrotating display mechanism suitable for rotating in opposite directions two different portions of a display.

It is a still further object of this invention to provide a compact mechanism for rotating two different portions of a display in opposite directions.

It is still another object of this invention to provide a counterrotating display mechanism incorporating low-cost parts.

Other and further objects of this invention will become apparent in the detailed description below in conjunction with the attached drawings wherein:

FIG. 1 is a perspective view of a first embodiment of the present invention disclosed with illustrative display components which are to be rotated in opposite directions.

FIG. 2 is an enlarged fragmentary cross-sectional view of the drive mechanism disclosed in FIG. 1 taken along line 2—2 in FIG. 1; and

FIG. 3 is an enlarged partially cutaway, fragmentary, perspective view of a portion of the drive mechanism in FIG. 1.

Referring now to the drawings, there is shown a frame 10 having power means in the form of a small electric motor 11 secured thereto. Above the frame 10 there is disclosed a lower platform 13 and an upper platform 14 which are rotated by the drive mechanism in opposite directions as indicated by the arrows 15. It is to be understood that the platforms 13 and 14 are merely for purposes of illustration, and other display components could be connected to the drive mechanism for counterrotation as desired.

Referring now to FIGS. 2 and 3, the drive mechanism will be described in further detail. The frame 10 comprises a web plate 16 with an upper wall, or flange, 17, at the upper edge of the plate 16, while a lower wall, or flange, 18, extends at a right angle from the lower edge of the web plate. For purposes of stability, the flanges 17 and 18 are joined by side walls, or flanges, 19 which also are joined to the respective side edges of the web plate 16. Mounting tabs 20 projecting from the side flanges 19 afford a means for mounting the frame 10 to some support as desired.

In FIG. 2, it can be seen that the upper flange 17 is provided with a hole 21 while the lower flange 18 is provided with a hole 22, each of which holes is disposed on a vertical axis. It is desired that the frame 10 be constructed of thin material, and therefore, since most of the lateral loads are impinged on the frame at the upper flange 17, there is provided bearing means for supporting these lateral loads. The bearing means includes a bearing member 24 having a reduced portion 25 at its lower end with a top flange portion 26. The reduced portion is of slightly larger diameter than the diameter of the hole 21, and the bearing member 24 is pressed into the hole to the position shown where it is held by the press fit relation between the wall of the hole 21 and the reduced portion 25.

The bearing member 24 has therethrough an axial hole 27 which receives in rotating relation a first driven shaft 30, and the bearing member affords lateral support for the first driven shaft in the area of the upper flange 17. Disposed above the top flange portion 26 of the bearing member 24 is a collar 31 which is fixed to the driven shaft 30 by means of a set screw. It will be noted that the collar 31 rests upon and receives support by the upper surface of the top flange portion 26 so that the weight on the lower platform 13 is supported by the relatively rugged structure of the heavy collar 31 and the top flange portion 26 of the bearing member 24. The driven shaft 30 is held against upward movement by means of a collar 32 which engages the lower edge of the reduced portion 25 and is fixed to the shaft 30 by means of a set screw. It will be noted that the lower platform 13 is held to the first driven shaft 30 by means of a set screw in a boss portion 33. Further, it will be noted that the platform 13 may be placed at any elevation on the shaft 30 since the downward thrust of the weight of the platform 13 is transmitted to the bearing member 24 through the collar 31. However, because the flange portion 26 is substantially larger than the diameter of the hole 21, there is no danger of pressing the bearing member 24 down through the hole 21 in the flange 17. The friction of the press fit relation between the wall of the hole 21 and the portion 25 is sufficient to offset any forces tending to raise the shaft 30 relative to the frame 10.

Toward the lower end of the driven shaft 30 there is provided a first driven gear 35, which has a reduced cylindrical collar portion 36 having a sufficient thickness to give proper room for threads of a set screw which secures

the gear to the shaft 30. The gear 35 is further defined by a circular plate 37 at the lower end of the cylindrical portion 36, and a depending cylindrical flange 38 at the peripheral edge of the circular plate. Also, the flange 38 has been notched to provide a circle of teeth 39, each of which has a relatively narrow face. Because of the light duty to which the drive mechanism is subjected, the narrow face on the teeth 39, is sufficient. Further, it is also important to note that, because of the narrow width of the faces of the teeth 39, the alignment of the faces relative to each other is not critical.

Extending through the shaft 30 is an axial hole 41 in which is journaled a second driven shaft 42. The second driven shaft 42 extends substantially above the upper end of the first driven shaft 30 in order to provide an area for mounting the other display element to be rotated—by way of example, the upper platform 14. The second driven shaft 42 also extends down below the first driven shaft 30 sufficiently that the lower end 44 of the second driven shaft depends through the hole 22 and the lower flange 18. Thereby, support against lateral movement is afforded the drive mechanism at the elevation of the flange 18. Since the lateral forces involved are not as large as the lateral forces involved in the area of the flange 17, there is no need to provide additional bearing means such as the bearing member 24.

Adjacent the lower end 44 there is provided a second driven gear 45 having a reduced cylindrical collar portion 46 in which is received a set screw for fixing the gear to the second driven shaft 42. The cylindrical portion 46 is of sufficient diameter to afford the set screw enough threads to accomplish its purpose. Also, it will be noted that the reduced portion 46 rotates on the upper surface of the flange 18 and supports the weight of the upper platform 14. The second driven gear 45 is further defined by a circular plate 47 at the upper end of the cylindrical portion 46 and an upstanding cylindrical portion 48 in which is provided a circle of teeth 49. The gear 45 is substantially the same as the gear 35—thus affording to the mechanism lower cost construction and gaining for the mechanism the advantages resulting in the narrow faces on the teeth 49.

Shifting now to the manner in which the motor 11 is mounted, there is provided a mounting rod 51 on either side of the motor 11 (only the mounting rod on the near side can be seen in FIG. 1 and only the mounting rod on the far side can be seen in FIG. 2). In the case of each mounting rod 51, there is provided a screw 52 extending through the motor 11 and threading into one end of the respective mounting rod. For purposes of securing the rods 51 to the web plate 16, there is provided a screw 53 for each mounting rod which screw extends through the web plate into the opposite end of a respective mounting rod. In FIG. 3, there is disclosed hole 54 through which is received the particular screw 53 for the mounting rod 51 on the far side of the unit.

The motor 11 rotates its drive shaft 56 to which is preferably attached a spur gear 57. The teeth of the drive gear 57 may be helical rather than axial as in the case of a spur gear; however, it is quite important that the diameter of the drive gear be constant over the entire width of the teeth forces.

It will be noted that an enlarged hole 58 is provided in the web plate 16 for purposes of permitting the drive gear 57 to be easily inserted therethrough, and thence between the driven gears 35 and 45.

With the assembly thus described, the motor is rotated to cause the drive shaft 56 to rotate in the direction of arrow 59 (see FIG. 3) which causes the gears 35 and 45 to rotate in the directions of the arrows 60 and 61, respectively. This causes the lower platform to rotate in the direction of arrow 62 and the upper platform 14 to rotate in the direction of arrow 63.

Several elements of the construction are quite important, in that they result in a drive mechanism which is not only compact but is very low cost to manufacture. Firstly, it can be seen that the individual parts are suitable to low cost manufacture. Further, the tolerances required by the various parts are not stringent.

By way of example, it should be noted that the teeth of the drive gear 57 have rather wide faces contrasted to the narrow faces of the teeth 39 and 49 of the driven gears 35 and 45. Because of this, and the fact that the drive gear 57 has a constant diameter over the width of the faces of its gear teeth, the electric motor 11 can be positioned closer to or further away from the driven gears 35 and 45 over the range equal to the width of the faces of the teeth 57 without affecting the operation of the mechanism. If, for example, beveled gears were substituted for the drive gear 57 and the driven gears 35 and 45, the electric motor 11 would have to be positioned quite accurately relative to the driven gears. Further, by providing that the teeth 39 and 49 have a very narrow face, the requirement for quality in the teeth becomes less stringent.

Also, it will be noted that the first driven shaft 30 is merely a tube, while the second driven shaft 42 is merely a rod. And, because of the long bearing surface afforded through the engagement of the wall of the hole 41 and the shaft 42, the dimensional relationships between the diameter of the hole 41 and the shaft 42 are not critical so long as the diameter of the former is more than the latter.

Also, the assembly of the unit is easily accomplished. After the bearing member 24 is press fit into its relation. the shaft 30 may be extended down through the hole 27 with the collar 31 slidably held on the shaft. Then, the shaft 30 is threaded through the collar 32, and thence the driven gear 35. Then, the second driven shaft 42 is threaded through the hole 41 and the second driven gear 45. The second driven gear 45 is then fixed to the shaft 42 (by tightening the set screw) sufficiently above the lower end 44 to allow the lower end to project through and receive lateral support from the wall of the hole 22.

At this point, the electric motor 11 with its drive gear 57 is installed to the position shown. Then, the shaft 30 is allowed to move to a position where its lowering end is just above the upper side of the gear 45, at which point in the assembly the collar 31 is positioned and its set screw is tightened, then the process is repeated for the collar 32. Then, the driven gear 35 is lowered on the shaft 30 until the teeth 39 are in the desired cooperative relationship with the teeth of the drive gear 57 and the set screw of the driven gear is tightened. Naturally, the steps of assembly can be varied somewhat.

While only one embodiment of the present invention has been shown and described in detail, it will be apparent to those skilled in the art that such is by way of illustration only and numerous changes may be made thereto without departing from the spirit of the present invention. Accordingly, it is my intention that the invention be limited solely by the appended claims.

I claim:

1. A counterrevolving display mechanism comprising:
   - a frame having a top and a bottom flange, said top and bottom flange each having a hole therethrough on a same vertical axis;
   - a first driven shaft disposed in said frame for rotation about said vertical axis, said shaft having an axial hole therethrough;
   - a first driven gear secured to said first driven shaft, said gear having a circle of downwardly facing teeth;
   - a second shaft rotatably mounted on said frame;
   - a second driven gear secured to said second shaft, said second gear having a circle of upwardly facing teeth;
   - bearing means at the hole of said top flange for supporting said first shaft, said bearing means including:
     - a first bearing member having a reduced portion at its lower end, said reduced portion projecting through said hole in said top flange and

being in press fit relation with the wall of said last mentioned hole, said bearing member having a top flange portion engaging the upper surface of said top flange;

a first collar secured to said first shaft and supporting said first shaft by engagement with the upper surface of said bearing member;

a second collar secured to said first shaft and engaging the bottom of said bearing member;

a driving gear mounted for rotation about an axis which is at a right angle to said vertical axis, said driving gear being disposed between and in operating relation with said first and second driven gears, whereby said first collar supports weight on said first shaft and said second collar keeps said first driven gear in operating relation with said driving gear.

2. The mechanism set forth in claim 1 wherein:

said teeth of said first and second gears have narrow faces.

3. The mechanism set forth in claim 1 wherein:

said second shaft has a lower end projecting through said hole in said lower flange;

and said second driven gear has a depending reduced cylindrical portion engaging the upper surface of said lower flange, whereby said second shaft lower end receives guiding support from said hole in said lower flange and said depending cylindrical portion supports said second shaft against downward movement.

4. The mechanism set forth in claim 1 wherein:

said second shaft extends out of the hole in said first shaft a substantial distance, and including:

a first display component secured to said first shaft above said first collar;

and a second display component secured to said second shaft at a portion where the second shaft is outside said first shaft.

5. The mechanism set forth in claim 1 including:

a motor secured at one side of said frame to one side of said vertical axis;

means connecting said driving gear to said motor;

and a mounting flange on said frame disposed on the side of said frame opposite said motor.

6. The mechanism set forth in claim 1 wherein:

said first and second driven gears each include:

an axially extending reduced cylindrical collar portion;

a thin circular flange extending from said plate parallel to said vertical axis;

a plurality of teeth on said circular flange, said teeth each having a narrow face;

and said driving gear has a width many times greater than said driven gears and said driving gear has a constant diameter across its face, whereby said driving gear may be positioned along its axis over many positions without being disengaged from said driving gears.

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U.S. Cl. X.R.

74—665; 108—103; 312—135