

March 10, 1959

J. M. BROWN ET AL  
ANTENNA PEDESTAL MOUNT

2,877,459

Filed May 28, 1956

4 Sheets-Sheet 1

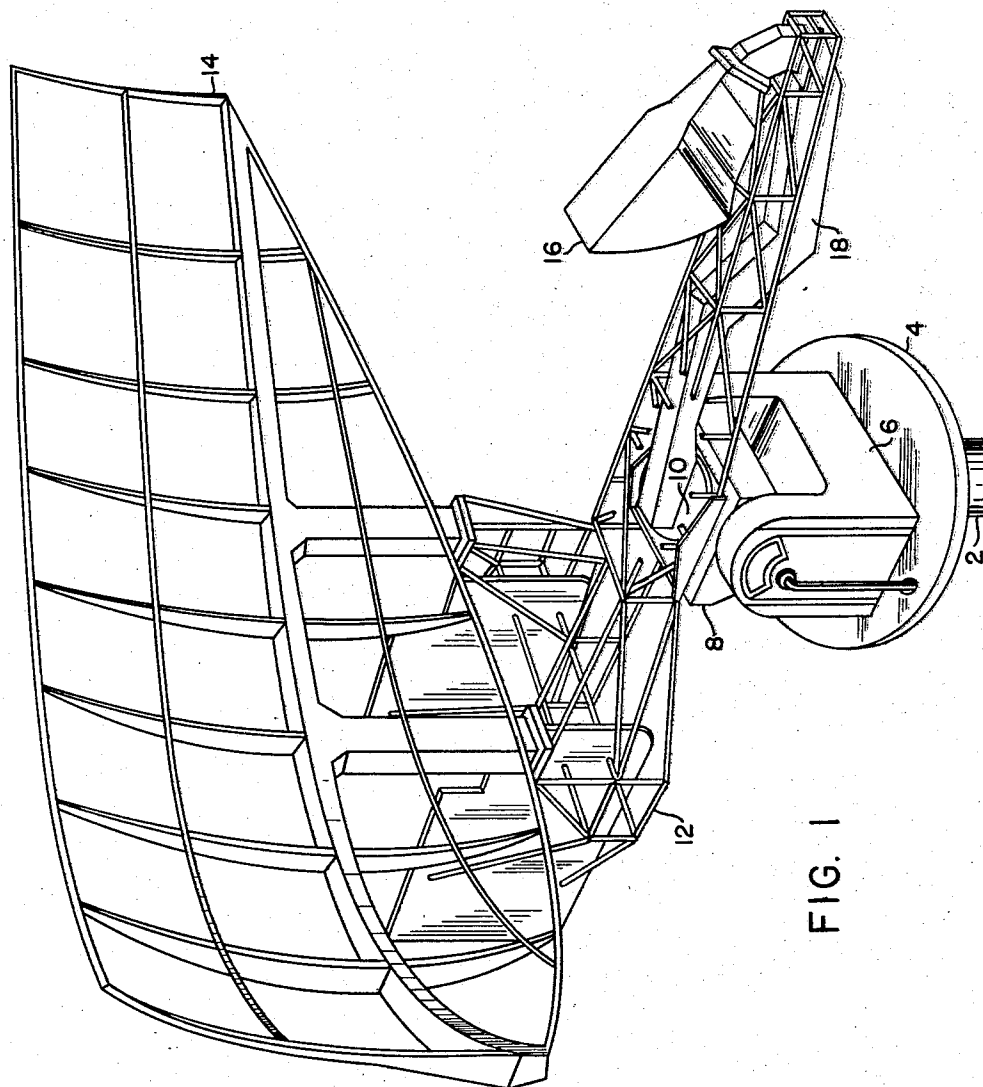


FIG. 1

INVENTORS  
JOSEPH M. BROWN  
WILLIAM R. CARMAN  
SOL ZWIRN

BY *Leonard H. King*  
AGENT

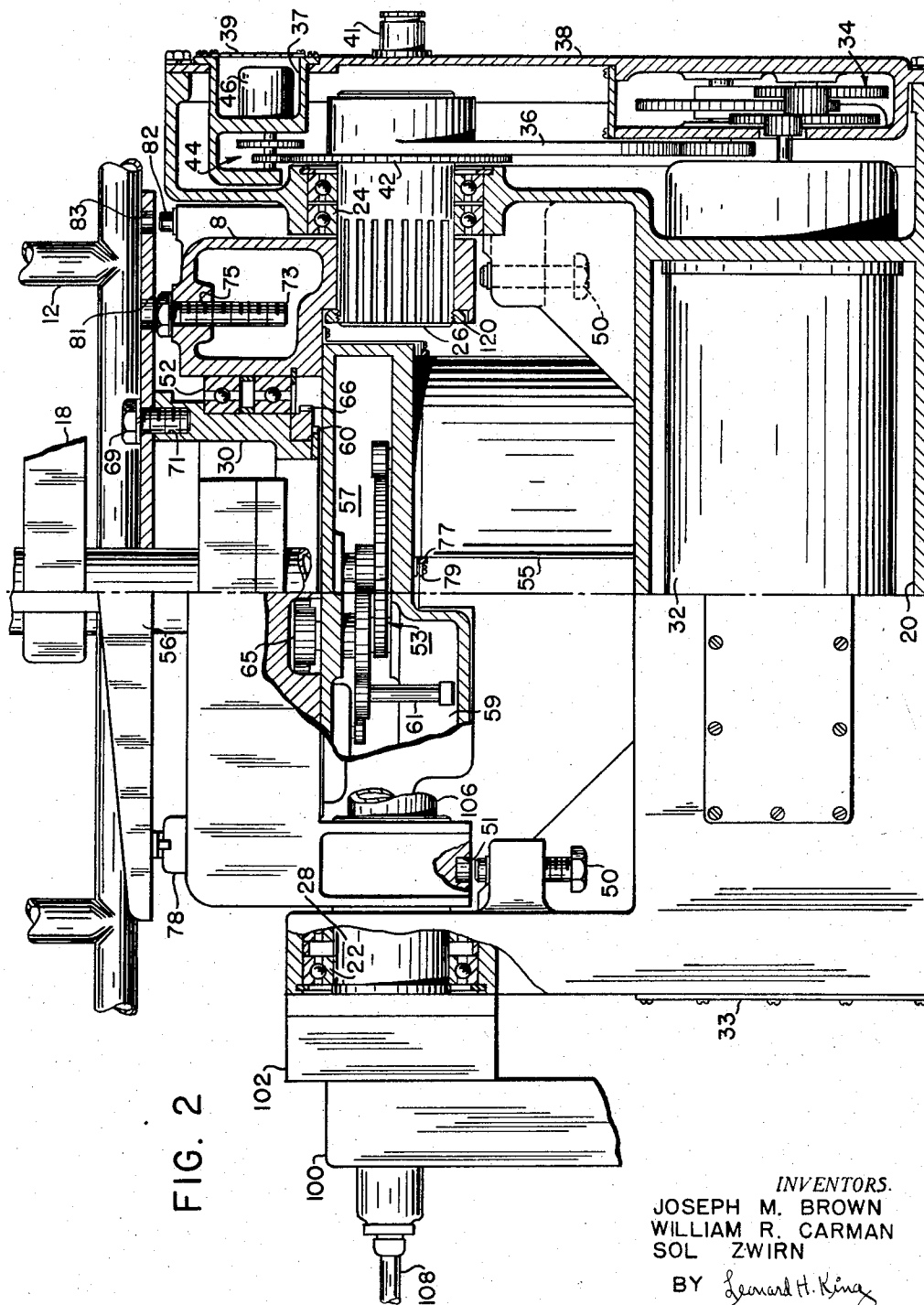
March 10, 1959

J. M. BROWN ET AL  
ANTENNA PEDESTAL MOUNT

2,877,459

Filed May 28, 1956

4 Sheets-Sheet 2



INVENTORS.  
JOSEPH M. BROWN  
WILLIAM R. CARMAN  
SOL ZWIRN  
BY *Leonard H. King*  
AGENT

Filed May 28, 1956

## ANTENNA PEDESTAL MOUNT

4 Sheets-Sheet 3



**INVENTORS.**  
**JOSEPH M. BROWN**  
**WILLIAM R. CARMAN**  
**SOL ZWIRN**  
**BY** *Leonard H. King*  
**AGENT**

March 10, 1959

J. M. BROWN ET AL  
ANTENNA PEDESTAL MOUNT

2,877,459

Filed May 28, 1956

4 Sheets-Sheet 4

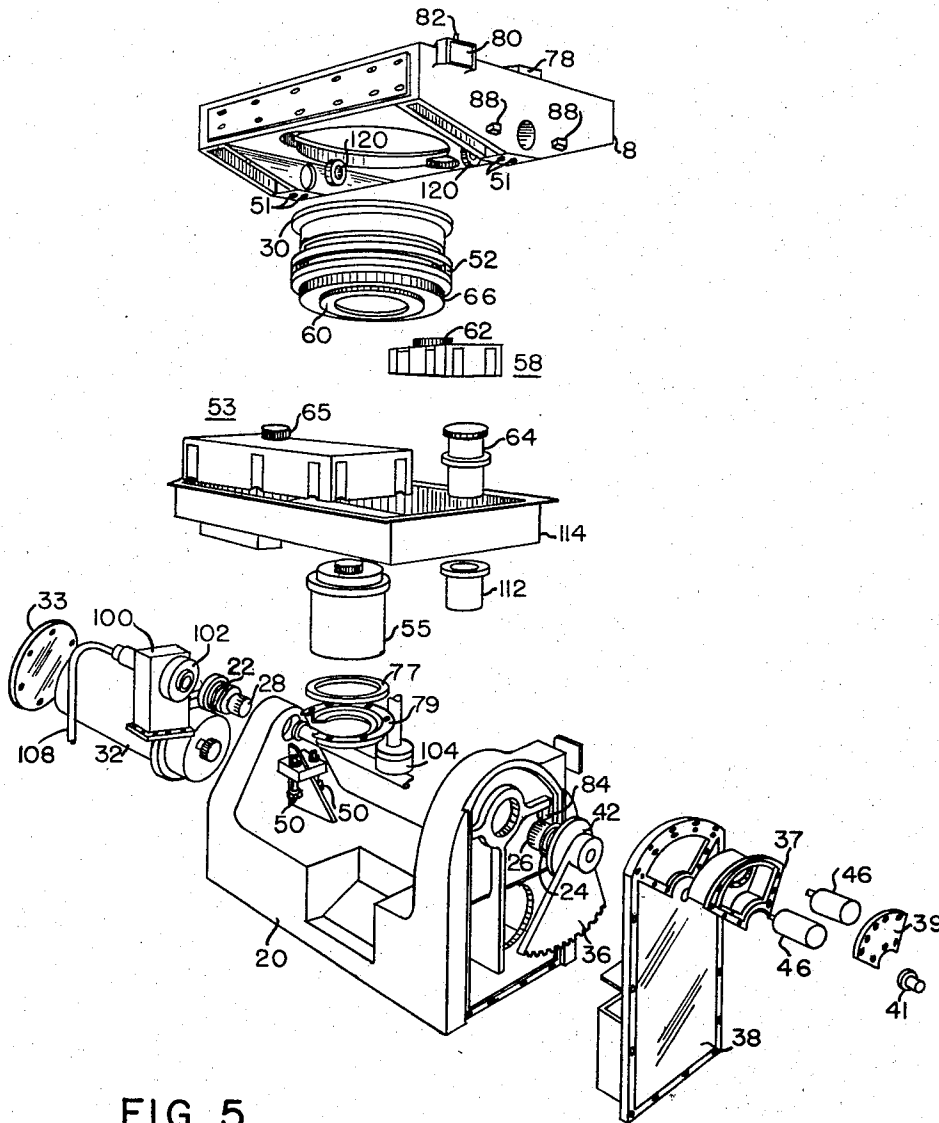


FIG. 5

INVENTORS.  
JOSEPH M. BROWN  
WILLIAM R. CARMAN  
SOL ZWIRN  
BY *Leonard H. King*  
AGENT

1

2,877,459

## ANTENNA PEDESTAL MOUNT

Joseph M. Brown, Glen Head, William R. Carman, Hempstead, and Sol Zwirn, East Meadow, N. Y., assignors to Sterling Precision Corporation, Instrument Division, Flushing, N. Y.

Application May 28, 1956, Serial No. 587,731

4 Claims. (Cl. 343-757)

This invention relates to improved rotatable mounting means for antennas.

The physical aspects of repairing and maintaining shipborne radar has been a major problem to the naval forces. A shipborne radar frequently has an antenna of the order of 10 to 20 feet in spread and a weight, with its pedestal, of about 1000 pounds. The pedestal contains the motive equipment for rotating the antenna. In order to obtain maximum range and minimum electrical interference, the antenna and mount are installed on the top of the ship's mast, or other elevated structure.

Prior art design for the pedestal necessitated removal of the antenna and pedestal from the mast before repairs could be made. This implies the return of the vessel to a friendly port having crane facilities adequate to remove the equipment from the mast. The disadvantages of this situation, particularly in time of war, are obvious.

A further disadvantage of the prior art devices is that they required highly trained experts for initial assembly and subsequent repair. The devices disclosed hereinafter may be readily repaired without removal of the antenna from the mast by technicians of ordinary skill.

In the prior art devices a pedestal mounting is employed which is used as a chassis for the support of the various gears and components. Despite the provision of access covers the equipment is difficult to service. Much of the gearing, shafting, and other mechanism cannot be removed or replaced without first completely removing the radar antenna and its support beam. The device of this invention utilizes a framework to which are attached various sub-assemblies containing such items as gear trains and synchros. Means are provided for supporting the various elements of the system, such as the antenna, independently of the normal supporting structure. This permits repair or replacement of such items as the turntable, turntable bearings, drive and sensing gears by the average technician without necessitating return of the ship to port.

Accordingly it is an object of this invention to provide an antenna pedestal of modular construction.

It is a general object to provide a readily serviceable antenna support and rotating means.

It is a particular object of this invention to provide a rotatable antenna pedestal having provision for replacement of components without requiring removal of the antenna or of the pedestal.

Another general object is to provide an improved rotatable mount for shipborne radar antenna.

Another object is to provide an antenna pedestal utilizing gear trains in independent housings.

A further object is to provide an antenna pedestal of such construction as to permit assembly and repair by technicians of ordinary skill.

Still other objects and advantages will be pointed out with particularity or will be obvious as the following description proceeds.

2

For a better understanding of the invention, reference is made to the accompanying drawings in the description given hereinafter.

Figure 1 shows pictorially a typical search antenna and pedestal mounted in operating position on the mast of a ship.

Figure 2 shows in elevation, and partially cut away, a side view of the antenna pedestal of this invention.

Figure 3 shows in elevation, and partly broken away, a side view of the antenna pedestal of this invention.

Figure 4 is a detailed showing, in cross-section, of an antenna jacking means.

Figure 5 is an exploded pictorial showing of the various assemblies and sub-assemblies of the antenna pedestal of this invention.

There is disclosed herein a pedestal for a stabilized antenna although it is to be understood that the invention is applicable to unstabilized antennas which are limited to but one mode of rotation. The unstabilized antennas are not as desirable. With an unstabilized antenna under conditions in which the ship is heeled well over, it is possible for the antenna to be scanning adjacent areas of the sea, or completely uninhabited portions of the sky. With the ship rolling heavily with a fairly regular periodicity, it is possible that the train and roll frequencies may become synchronized so that targets normally detectable by a stabilized antenna would be missed completely. An antenna stabilized against roll greatly increases the probability of detection.

In Figure 1 there is shown ship's mast 2 having rigged thereupon platform 4. Upon platform 4 there is mounted pedestal 6 which includes a tiltable head 8. In turn the tiltable head carries a turntable 10. Antenna supporting beam 12 is attached to turntable 10. Antenna "dish" 14 is excited by horn 16 which is fed by waveguide 18.

Referring now to Figures 2 and 3 there is shown the pedestal casting 20 which is provided with bearings 22 and 24. Tiltable head 8 is pivoted in bearings 22 and 24 by means of splined shafts 26 and 28. The tiltable head 8 is oriented with the bearings mounted fore and aft with respect to the ship's center line. The elevation of the tiltable head 8 is controlled by elevation motor 32. The motor 32 is readily available for replacement through an access panel 33. Power from the motor 32 is transmitted through a gear train, shown generally at 34 to the elevation drive sector gear 36. A feature of the invention is that the entire gear train is enclosed in a separate housing 38 which may be readily removed and replaced as a unit in case of a failure of the gear train. As is well known to those familiar with the radar field as part of normal operation, it is necessary to provide information as to the elevation of the antenna. This is accomplished by means of fine-toothed gear 42, gear train 44 and synchro 46. Gear train 44 and synchro 46 are built as a self-contained package into housing 37 so that they may be easily removed and replaced as a unit.

Bearings 22 and 24 may be replaced by use of four jacking screws 50 which when tightened into receiving bores 51 will remove the load from bearings 22 and 24 as well as shafts 26 and 28 so that they may be removed and replaced. Figure 5 shows in perspective, this jack arrangement.

Tiltable head 8 supports radial thrust bearings 52. In turn antenna support plate 56 is carried by turntable 30 which rotates in bearings 52. There is provided a self-contained train drive gear train package 53. The gear package may be replaced as a unit by the removal of a few locking bolts.

Train drive motor 55 drives gear train 57 contained in train drive gear train package 53. Oil sump 59 contains a lubricant which is distributed by an oil pump supplied by tube 61.

Train position information is transmitted by fine-tooth gear 60 to a train synchro package 58 (Figure 3) comprising gear train 62 and synchro 64.

Referring now to Figure 4, there are provided eight or other suitable number of bolts 73 located in threaded holes 75. The bolts are located on a common circle so that in this view only one bolt is visible.

Should it be necessary to replace drive gear 66 or bearing 52 then alternate bolts 73 are backed out of threaded holes 75 through access openings (not visible in the drawing) and reinserted into threaded holes through holes 81. This serves to securely lock the antenna and support to the pedestal. Then as the set of bolts 73 passing through holes 81 are gradually loosened the other set of bolts 73a (not passing through holes 81) are backed up so as to raise the antenna and permit removal of the locking ring 67 and then bearings 52. Member 30 is removed by backing bolts 69 out of holes 71. While for clarity only one bolt 69 is shown it should be understood that several such bolts are employed.

Other jacking means may be employed without departing from the spirit of the invention.

Switch 78 serves as a ship's head marker in accordance with standard radar practice.

Conventional train stowing solenoid 80 actuates pin 82 to stow the antenna. Likewise there is provided an elevation stowing locking means.

Limit switch 84 deenergizes elevation drive motor at the extreme elevation angle desired.

A hydraulic buffer 86 in conjunction with lugs 88 provides a mechanical stop.

Waveguide 100 couples energy into a waveguide rotary joint 102, which in turn is coupled to waveguide rotary joint 104 by coaxial transmission line 106. Waveguide 18 is coupled to waveguide joint 104, through conventional R. F. fittings. I. F. F. signals are coupled into waveguide joint 102 by means of coaxial cable 106.

Pedestal casting 20 is provided with a plurality of access covers for aerodynamic streamlining. The assemblies and sub-assemblies comprising the pedestal mount of this invention are shown in the exploded view of Figure 5.

Pedestal casting 20 is provided with elevation bearings 22 and 24 which are readily removable once the load is relieved by means of jacking screws 50 which engage bores 51. Elevation motor 32 is accessible for replacement through access plate 33. Sector drive gear 36 is accessible when housing 38 is removed. Housing 38 contains synchros 46 which are in turn accessible through access panel 39. Stuffing tube 41 completes the assembly.

Train drive package 53 contains a gear train 57. Train drive motor 55 is sealed into the package 53 by means of weather tight seal 77 and clamp 79. Gear train 57 (not visible in this view) terminates in train drive pinion 65 which engages train drive gear 66.

Train synchro drive gear 60 is coupled to gear train 62. Train synchro 64 couples into package 58. Weather-proof covers 112 and 114 protect the synchro 68, train drive package 53 and train synchro 55.

Shafts 26 and 28 are locked into tiltable head 8 by means of threaded locking rings 120.

Thus it may be appreciated that novel means have been provided to remove load bearing members from the antenna pedestal of this invention without the removal of the antenna from the pedestal. Further it should be noted that critical fitting of gears and the like need not be performed by the repairman who merely replaces complete assemblies.

As employed herein, the term "train" refers to angular motion about an axis perpendicular to the plane of a ship's deck.

This application is a continuation in part of our co-pending application entitled "Improved Antenna Pedestal Mount," Serial No. 567,279, filed on February 23, 1956, now abandoned.

While in accordance with the statutes we have disclosed herein the best mode of carrying out the invention presently contemplated, it is to be understood that various modifications and changes may be made by those skilled in the art without departing from the spirit of the invention and that therefore we wish to be limited only by the scope of the appended claims.

What is claimed is:

1. In combination with an antenna, a supporting frame, a pair of bearing members supported by said frame, a pair of shafts positioned in said bearing members, a tiltable member supported by said shafts, means attached to said frame for rigidly supporting said tiltable member independently of said shafts, a sector gear coupled to said tiltable member, an elevation gear train engaged with said sector gear characterized by being mounted on an independent chassis, a motor arranged to actuate said elevation gear train, turntable bearings supported by said tiltable member, rotatable turntable means supported in said turntable bearings, and a train drive gear affixed to said turntable means, a train gear train package attached to said supporting frame and arranged to engage said train drive gear, a train drive motor supported by said support frame and arranged to engage said train drive gear, a train drive motor supported by said support frame and arranged to engage said train gear train, antenna support means attached to said turntable, and means attached to said frame arranged to rigidly support said antenna and said antenna support independently of said turntable means.

2. In combination with a rotatable antenna: a supporting frame; a tiltable member, tiltable supported by said supporting frame; alternative means attached to said supporting frame for rigidly supporting said tiltable member; a sector gear connected to said tiltable member; an elevation gear train assembly, in a self-contained assembly mounted on said frame, engaged with said sector gear; an elevation sensing gear attached to said tiltable member; an elevation sensing gear train, in a self-contained assembly attached to said frame, engaged with said elevation sensing gear; an elevation motor attached to said frame and arranged to engage said elevation gear train; a selsyn engaging said elevation gear train; a train drive gear attached to said turntable; a train sensing gear attached to said turntable; a train drive gear train, in a self-contained housing attached to said tiltable member, engaged with said train drive gear; a train sensing gear train, in a self-contained housing attached to said tiltable member, engaged with said train sensing gear; a selsyn attached to said tiltable member and engaged with said train sensing gear train; and a drive motor supported by said tiltable member and engaged with said train drive gear train.

3. The apparatus of claim 2 wherein said alternative means for rigidly supporting said antenna on said supporting frame comprises a plurality of bolts arranged to draw said antenna toward said supporting frame and jacking means for supporting said antenna on said supporting means but spaced therefrom.

4. In combination with a rotatable antenna: a supporting frame; a turntable for supporting said antenna carried by said supporting frame member; a train drive gear attached to said turntable; a train sensing gear attached to said turntable; a train drive gear train, in a self-contained housing attached to said supporting frame, engaged with said train drive gear; a train sensing gear train, in a self-contained housing attached to said supporting frame and

engaged with said train sensing gear train; a drive motor supported by said tiltable member and engaged with said train drive gear train; means for rigidly supporting said antenna on said supporting frame independently of said turntable.

5

**References Cited in the file of this patent****UNITED STATES PATENTS**

|           |           |               |
|-----------|-----------|---------------|
| 2,417,086 | Proskauer | Mar. 11, 1947 |
| 2,707,400 | Manger    | May 3, 1955   |
| 2,715,776 | Knowles   | Aug. 23, 1955 |