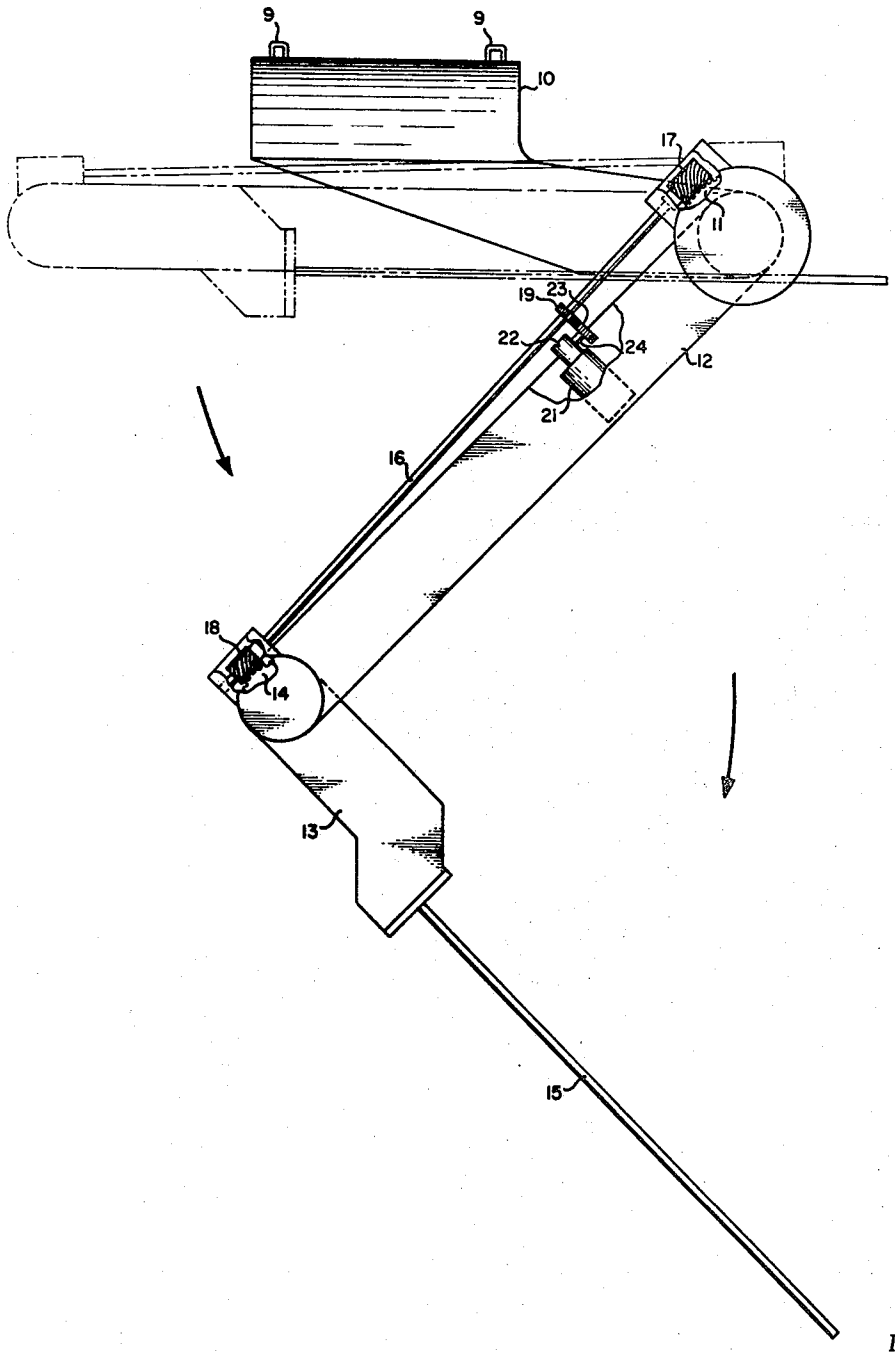
Dec. 24, 1968 W. U. MATSON 3,417,523

FOLDING ANTENNA MOUNT

Filed April 25, 1967



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United States Patent Office 3,417,523 Patented Dec. 24, 1968

3,417,523

FOLDING ANTENNA MOUNT

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Filed Apr. 25, 1967, Ser. No. 634,799
3 Claims. (Cl. 52—110)

ABSTRACT OF THE DISCLOSURE

This invention is directed to an antenna system which folds the antenna for storage when not in use and which lowers and extends the antenna when in use. A single motor rotates a shaft that has a worm gear at each end thereof. One end rotates about a stationary gear secured to the housing while the opposite end rotates a gear wheel which is attached to the antenna holder. The ratio of the worm gear pairs to each other is two to one such that the section connected to the housing rotates through 90 degrees while the antenna holder section rotates about 180 degrees. Thus the antenna will be extended normal to the housing within which the antenna is stored.

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

The present invention relates to an antenna used for receiving and transmitting radio signals and more particularly to a system for storing and extending an antenna for a desired use.

Heretofore radio antennas have been telescoped or extended by hydraulic pistons and cylinders or by electrically driven equivalents of hydraulic systems. Hydraulic systems require many valves requiring control lines resulting in a very heavy assembly. Electrical equivalents of a hydraulic system require a plurality of sources which makes control difficult.

The present invention overcomes the drawbacks of the prior art by using a single drive means which is driven by one electric motor that rotates in either direction depending on whether the antenna is being lowered or raised into its stored position. The electric motor is mounted on the movable antenna mount therefore the antenna system is independent of the device to which it is mounted except for an electrical power source. Suitable control switches are used to stop the drive motor when the antenna is in either the up or down position.

It is therefore an object of the present invention to provide a simple folding antenna mount which will store the antenna in a housing and yet extend the antenna relative to the housing.

Another object is to provide a simple drive means for folding and extending an antenna relative to a housing.

Still another object is to provide a folding antenna that requires no counterbalance and which has a good mechanical advantage.

Yet another object is to provide a suitable antenna mount for folding an antenna into a compact configuration for easy storage during transport and for easy use.

Other objects, features and advantages will appear from consideration of the following specification relating to annexed drawing, in which:

The drawing illustrates a folding antenna mount with the antenna shown by dotted line in a stored position and in full view partially extended.

Now referring to the drawing, there is shown by illustration a folding antenna system including frame **10** upon which the antenna is supported and which is secured by any conventional fastening means such as suitable hooks

9 to any desired device that requires the use of a folding antenna. One end of the frame has a stationary gear wheel **11** secured thereto about which a link or arm **12** rotates. The opposite end of arm **12** has an arm **13** connected thereto for movement about an axis. The arm **13** has a gear wheel **14** rigidly secured thereto and which is rotatable relative to arm **12**. An antenna **15** is rigidly secured to the opposite end of arm **13** and extends therefrom for any desired length. A drive shaft or rod **16** extends along the length of arm **12** and is mounted thereon for rotation in suitable bearings at each end thereof. The drive shaft is provided with worms **17** and **18** one at each end thereof in gear meshing relationship relative to gears **11** and **14**, respectively to form worm-gear pairs. The shaft is also provided with a gear **19** secured thereto between gears **17** and **18** for the purpose of driving the drive shaft and simultaneously rotating worms **17** and **18**.

A motor **21** provided with a reduction gear box arrangement **22** drives a gear wheel **23** through shaft **24**. Gear wheel **23** meshes with gear wheel **19** on the drive shaft for the purpose of rotating the drive shaft and worm gears **17** and **18**. The system is provided with an electrical circuit connection which connects the motor with an electrical potential for operation of the motor. Electrical switches are also connected into the electrical circuit for the purposes of limiting movement of the arms in an extended position as well as in a stored position. The electrical circuitry and control switches are not shown for simplification of the drawing. The electrical circuitry also includes appropriate circuitry to a suitable indicator lighting system to indicate when the antenna is extended, "down," and when locked in place in a folded condition, "up."

In operation, assuming the antenna to be in its stored position as shown in dotted line in FIG. 1, the electrical switch is closed to operate the motor in the proper rotational direction to lower the antenna. The motor rotates the drive shaft **16** thereby rotating the worm gears **17** and **18**. As the worm gear **17** rotates with respect to the stationary gear wheel **11**, the shaft and the arm to which the shaft is attached rotates about the stationary gear wheel **11** thereby lowering the arm **12**. Simultaneously, worm gear **18** is rotated with worm gear **17** thereby rotating gear wheel **14** relative thereto. Gear wheel **14** is rigidly secured to arm **13** therefore arm **13** is moved relative to arm **12** as gear wheel **14** rotates relative to worm gear **18**. The relationship between worm **18** and gear wheel **14** is such that gear wheel **14** moves arm **13** through 180 degrees while arm **12** moves through 90 degrees. Thus, the ratio of gear wheel **14** to worm gear **18** is such that arm **13** moves twice as fast as arm **12**. When the arms **12** and **13** have been moved to their maximum, a limiting switch is contacted thereby stopping the motor and operation of drive shaft **16**. The arms are now normal to the holder and extended their maximum.

In order to raise the antenna the motor is actuated in the opposite direction reversing the movement of the drive shaft and the arms. Arm **12** is moved through 90 degrees and arm **13** is moved through 180 degrees such that they are in their closed position. When in their closed position, arm **13** is substantially parallel with arm **12** and a control switch is actuated to limit the movement of the arms into their closed position. Separate control light indicators are actuated in the open and closed position to indicate whether the antenna is in the closed or open position. When the antenna is in the up position, the antenna **15** is supported in a cantilevered manner. In order to reduce destructive vibration, a spring-type clip is incorporated which clasps the antenna lightly when in its up position thereby reducing forced vibrations which may damage the antenna.

Through incorporation of a suitable electrical control circuitry and a suitable potential to drive the motor, each of which are connected to a quick disconnect electrical connect in an airplane, a helicopter, or other device, the antenna mount may be connected thereto by use of a mating electrical connector which is connected to the motor and the limiting switches in the antenna mount. Thus by use of a quick connector the antenna mount may be hooked onto any desired device and operated by a control system within the device.

Thus, it is seen that the antenna of the present invention may be operated from a stored or closed position to an open position by a single motor and simple drive system and then returned back to the closed position as desired.

Although the worm-gear ratios with reference to each other as chosen above are 2 to 1, other such configuration can be satisfied by use of other ratios or by drives of opposite hands and types. A different storage arrangement may require a ratio of 1 to 2 or any other satisfactory ratio which will be obvious from the teaching of the present invention.

The present system may be expanded to include more than the two links or arms shown. Thus, drives mounted on the additional arms will be driven by suitable drive means arranged to be driven by a drive means such as shown.

Obviously many modifications and variations of the present invention are possible in the light of the above teachings. It is therefore to be understood, that within the scope of the appended claims, the invention may be practiced otherwise than as specifically described.

What is claimed and desired to be secured by Letters Patent of the United States is:

1. A folding antenna mount which comprises:
a housing,
hanger means on said housing for securing said housing to a desired body,
a first fixed gear mounted on said housing,
a first arm,
said first arm mounted at one end relative to said first gear and said housing for rotation about said first gear,
a second gear,
said second gear mounted on the end of said first arm opposite from said first gear for rotation relative thereto,
a second arm,

said second arm being secured to said second gear for rotational movement therewith,
an arm drive means,
said arm drive means being affixed to said first arm and including,
a single drive shaft extending along the length of said first arm,
a drive gear mounted onto each end of said drive shaft in driving engagement with said first and second gears and a driven gear between said drive gears on each end thereof,
a motor means mounted on said first arm in driving engagement with said driven gear on said single drive shaft,
said arm drive means rotating said first arm about said first fixed gear through an angle of about 90 degrees and simultaneously rotating said second arm in driving engagement therewith through a rotation of about 180 degrees,
whereby rotation of said arm drive means in one direction from a stored position extends said arms normal to said housing and rotation in the opposite direction from an extended position folds said arms into said housing, and
an antenna secured to said second arm.

2. A folding antenna mount as claimed in claim 1, which includes:
a limiting switch for controlling said motor means.

3. A folding antenna mount as claimed in claim 1, wherein,
said drive means is related to said first and second gear wheels such that their rotational ratio is two to one.

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U.S. Cl. X.R.

343—881; 52—117