Nov. 19, 1946. A. A. SLOBOD 2,411,472

ANTENNA SYSTEM

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Fig. 1.

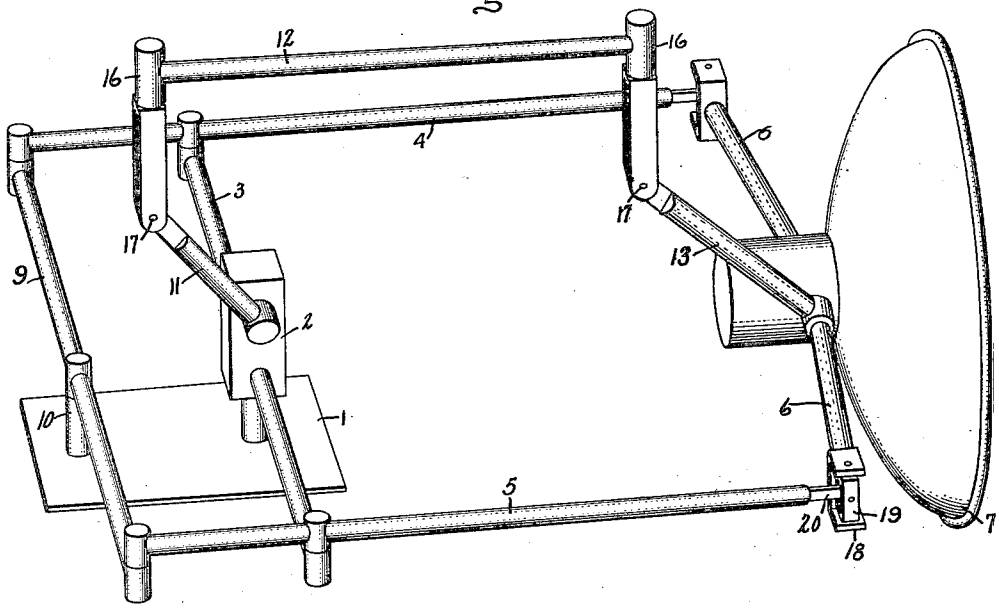
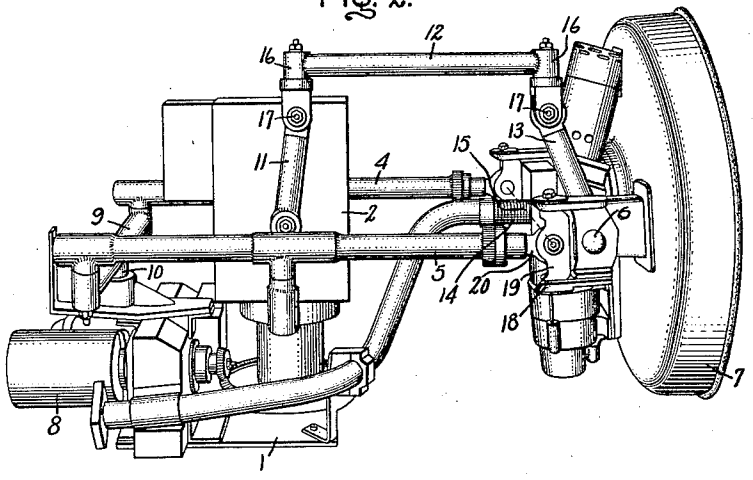


Fig. 2.



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ANTENNA SYSTEM

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4 Claims. (Cl. 250—11)

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The present invention relates to directional antenna systems adapted for mounting in a space of limited cross section such as in the wings or tail of an airplane.

The object of my invention is to provide an improved construction for supporting and orienting the antenna system which can be mounted at the rear of the antenna system in a space of limited cross section.

The novel features which I believe to be characteristic of my invention are set forth with particularity in the appended claims. My invention itself, however, both as to its organization and method of operation, together with further objects and advantages thereof, may best be understood by reference to the following description taken in connection with the accompanying drawing in which Fig. 1 is a schematic view of an antenna system embodying my invention, and Fig. 2 is a perspective view.

Referring to the drawing there is shown a support 1 on which is journaled a pedestal 2 fixed to the midpoint of a rear cross arm 3 of a parallelogram linkage having side arms 4, 5 and a front cross arm 6 fixed at its midpoint to a directional antenna system 7. The pedestal 2 is rotatable by a motor 8 through an angle of the order of 120 degrees and the azimuth of the antenna system is variable in the plane of the linkage through that angle since the cross arms 3 and 6 are constrained by the side arms 4, 5 to follow the angular position of the pedestal. For stability and accuracy, the side arms 4, 5 are extended to the rear of the cross arm 3 and tied together by a stabilizing cross arm 9 parallel to the cross arms 3, 6 and is pivoted at its midpoint 10 on the support. The cross arm 9 keeps the arms 4 and 5 parallel to the center line of the unit.

Journaled in the pedestal on an axis in the plane of the azimuth parallelogram linkage and parallel to the axis of the cross arm 3 is an arm 11 rotatable by a motor (not shown) on the pedestal and connected by an arm 12 to an arm 13 fixed to the antenna system and forming with the arms 11 and 12 a parallelogram linkage for tilting the antenna system in elevation with respect to the plane of the azimuth parallelogram linkage. The lower side arm of the elevation parallelogram linkage is omitted since it would extend between the fixed centers about which the arm 11 and the antenna system pivot in elevation. From Fig. 1 it will be noted that the front cross arm 6 of the azimuth linkage is not straight, but is bowed forward to allow a flexible wave guide 14 to be led in at the back of the antenna system. As shown in Fig. 2, it is not necessary that the arm 13 be parallel to the arm 11. However, with reference to the point 15 at the center of the wave guide about which point the antenna system pivots in azimuth and elevation, the enumerated arms constitute parallelogram linkages for orienting the antenna system in azimuth and elevation.

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To permit independent orientation of the antenna system in azimuth and elevation, it is necessary that there be no force transmitted to one linkage by relative movement of the other linkage. For the elevation linkage this is accomplished by joints 16 and 17 at opposite ends of the arm 12, respectively rotatable in azimuth and elevation. Thus, movement of the arm 6 in azimuth does not change the relative positions of the arms of the elevation linkage. In the azimuth linkage the front cross arm 6 is rotatable in both azimuth and elevation so that universal joints are required to connect the cross arm 6 with the side arms 4 and 5. The remaining joints of the azimuth linkage need only permit rotation in azimuth. The joints at the ends of the cross arm 6 consist of trunnions 18 journaled on an intermediate member 19 on an axis perpendicular to the axis of the cross arm 6. The members 19 are connected to the side arms 4 and 5 by members 20. The members 20 are journaled in the members 19 for rotation about an axis passing through the point 15 and the opposite ends of the cross arm 6. With this arrangement the members 20, which are free to rotate in the cross arms 4 and 5, turn to permit independent orientation in azimuth when the elevation adjustment is such that the members 19 are not perpendicular to the cross arms 4 and 5. The pivoting of the members 19 on the members 20 permits movement of the antenna system in elevation without affecting its azimuth. The antenna system accordingly can be independently oriented in azimuth and elevation.

While I have shown particular embodiments of my invention, it will be understood that many modifications may be made without departing from the spirit thereof, and I contemplate by the appended claims to cover any such modifications as fall within the true spirit and scope of my invention.

What I claim as new and desire to secure by Letters Patent of the United States, is:

1. In combination, a parallelogram linkage including a plurality of pivotally connected arms, directional antenna means fixed to a first arm

of the linkage, universal joints connecting each end of said first arm with the adjacent arms of the linkage, said joints including a member pivoted on the axis of one of said adjacent arms and on an axis perpendicular to the axis of said first arm whereby said directional means is independently orientable in azimuth in the plane of said linkage and in elevation with respect to said plane respectively by relative movement of the arms of the linkage and by rotation of said first arm about its axis.

2. In combination, a parallelogram linkage including a pair of end arms pivotally connected to a pair of side arms, directional antenna means supported for rotation about the axis of a first end arm of the linkage, means for maintaining said side arms in parallel spaced relation, means for effecting rotation of the other end arm of the linkage about an axis perpendicular thereto whereby the directional means is oriented in azimuth in the plane of the linkage, and means including another parallelogram linkage having an arm connected to said directional means and an opposite arm connected to said other end arm for orienting said directional means in elevation with respect to said plane.

3. In combination, a support, a parallelogram linkage including a plurality of pivotally connected arms, pivotal means mounting a first arm

of said linkage upon said support for rotation about an axis perpendicular to the plane of the linkage, a directional antenna system carried on the arm of said linkage opposite said first arm whereby the antenna system is oriented in azimuth in the plane of the linkage by rotation of said first arm, and means for orienting said antenna system in elevation with respect to said plane by rotation about the axis of said opposite arm.

4. In combination, a support, a parallelogram linkage including a pair of side arms pivotally connected to a pair of end arms, means for maintaining said side arms in parallel spaced relation, pivotal means mounting a first end arm on said support for rotation about an axis perpendicular to the plane of the linkage, a directional antenna system carried on the opposite end arm of said linkage, whereby the antenna system is oriented in azimuth in the plane of the linkage by rotation of said first end arm, and another parallelogram linkage connecting said first end arm and the antenna system in a plane transverse to the plane of the first linkage for orienting the antenna system in elevation with respect to the plane of the first linkage, said other linkage including an arm rotatable about the axis of said first end arm.

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