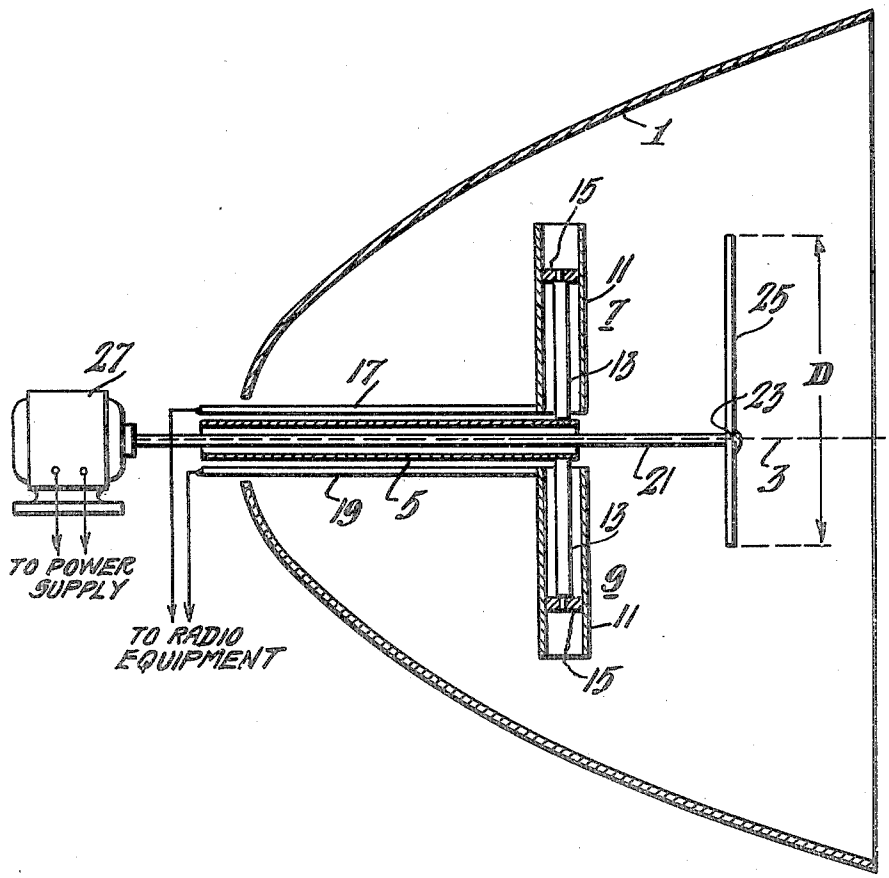
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DIRECTIVE ANTENNA SYSTEM

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DIRECTIVE ANTENNA SYSTEM

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This invention relates to directive antennas and more particularly to improvement in so-called "lobe switching" antennas, which are used to provide a sharp directive beam oscillating or changing in direction from side to side, or up and down, or both. Such antennas find application in radio object detectors, aircraft locators, and so on, wherein they are employed to provide scanning throughout a predetermined angle or sector.

The principal object of the instant invention is to provide an improved system of the described type involving a minimum of moving parts, requiring no rotating or oscillating transmission line connections, and capable of dependable and efficient operation.

The invention will be described with reference to the accompanying drawing, which is a sectional elevation of a typical embodiment thereof. A reflector 1 is provided, in the form of a paraboloid, and is made of conductive material such as sheet metal or expanded sheet metal. The paraboloid may be a simple paraboloid of revolution, or two or more intersecting cylindrical paraboloids. The axis of the reflector 1 is indicated by the dash line 3.

A tubular member 5 is disposed coaxially with said axis and extends through the vertex of the paraboloid and within the reflector 1 to a point near or at the focus, where it supports a pair of radiator elements 7 and 9.

The radiators 7 and 9 each comprise a tubular outer conductor 11, supported coaxially on an inner rod 13 by means of a conductive plug 15. The rods 13 are secured to and extend in opposite directions radially from the tubular member 5. Conductors 17 and 19 extend parallel to the member 5 and serve to connect the radiators 7 and 9 respectively to the radio equipment (not shown) with which the antenna is to be used.

A shaft 21 extends coaxially within the tubular member 5 to a point 23 on the axis 3 and in front of the radiators 7 and 9. A conductive plate or disk 25 is supported eccentrically on the shaft 21 at the point 23, and lies substantially in a plane perpendicular to the axis 3. The plate 25 may be of sheet metal, or may be an array of radial conductors or a sheet of expanded metal. Preferably it is counterbalanced so that its center of gravity coincides with the point 23. The other end of the shaft 21 is coupled to a motor 27, connected to a source of power (not shown).

The rods 13 cooperate with the sleeves 11 and the plugs 15 to function as short-circuited coaxial line sections connected between each radiator and the grounded supporting member 5. As is well known to those skilled in the art, such line sections may act as parallel resonant circuits. In the present illustration, the lengths of the rods 13 are chosen to provide inductive reactances between the radiator elements and the support 5. The radiator sleeves are of proper lengths to resonate, together with these inductances, at the frequency at which the system is to operate.

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The conductor 25 is made, in the present instance, with a maximum dimension D of less than one-half wavelength. Thus when the radiators 7 and 9 are excited, either by energy transmitted by the radio equipment or received by the reflector 1, the conductor is parasitically excited to function as a director, causing the directive pattern of the reflector and radiator combination to skew at an angle to the axis 3. With the parts in the position shown in the drawing, the axis of the directive pattern is above the axis.

As the shaft 21 is rotated by the motor 27, the directive axis moves circularly about the axis 3, thus "scanning" throughout an angle which depends upon the various dimensions of the system. It will be appreciated that inasmuch as the radiators themselves do not rotate, the connections 17 and 19 are stationary, and no rotating connections or slip rings are required for connecting the system to the radio equipment. Although the shaft 21 may be grounded, this is not necessary, because the director 25 will function equally well if not grounded.

Thus the invention has been described as an improved antenna system for providing a directive pattern whose axis varies cyclically. A stationary radiator is provided at the focus of a paraboloidal reflector, and a reflector is supported eccentrically with respect to the axis of the paraboloid, in front of the radiator. Rotation of the reflector about said axis causes the resulting beam to revolve about the optical axis.

I claim as my invention:

1. A directive antenna system including a paraboloidal reflector, stationary radiator means substantially at the focus of said reflector, a parasitic director antenna means in front of said radiator and eccentrically disposed with reference to the axis of said reflector, and means for rotating said parasitic director antenna means whereby said system provides a revolving directive beam.

2. A directive antenna system including a paraboloidal reflector, radiator means substantially at the focus thereof, director means in front of said radiator and eccentric with respect to the

axis of said paraboloid, and means for rotating said director means about said axis.

3. A lobe-switching antenna system including a parabolic reflector, a stationary radiator element substantially at the focus of said reflector, a shaft extending along the axis of said reflector, a substantially plane conductive member supported eccentrically on said shaft and in a plane perpendicular thereto and on the opposite side of said radiator from the vertex of said reflector, and means for rotating said shaft to revolve the directive pattern of said antenna system.

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