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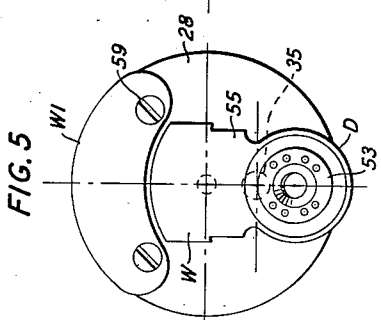
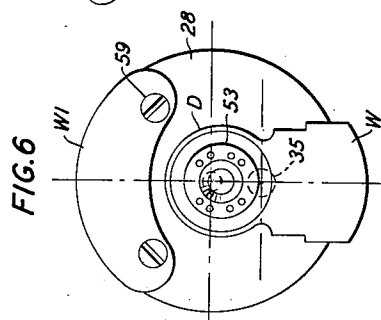
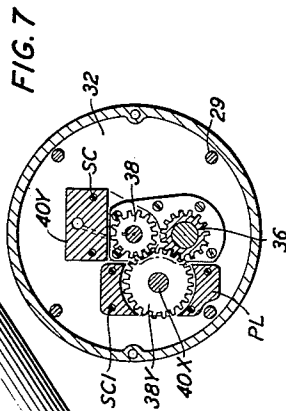
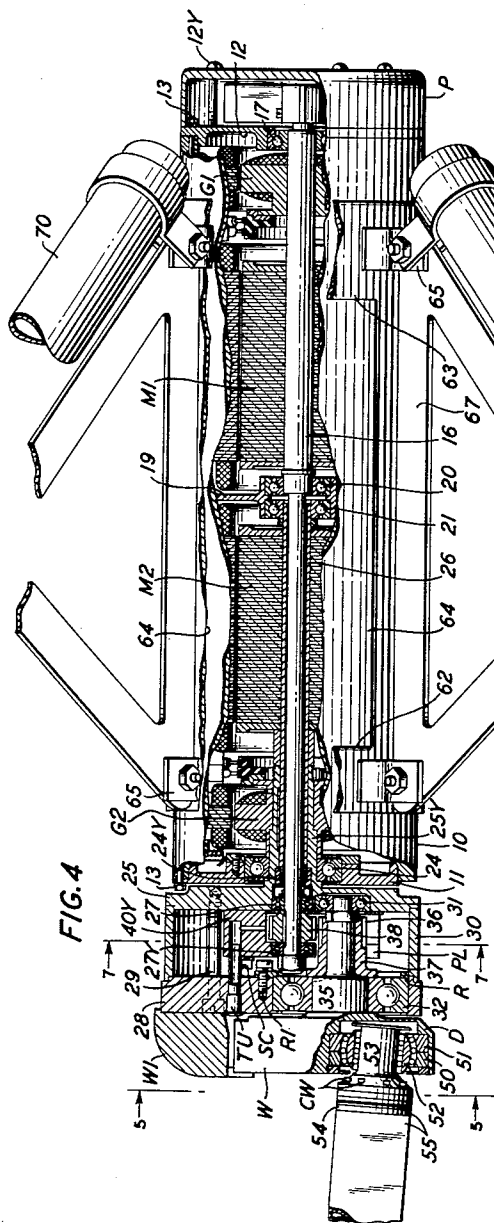
J. R. HEFELE ET AL

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SCANNING MECHANISM FOR RADIO SIGNALING APPARATUS

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INVENTORS
J. R. HEFELE
C. F. MATTKE
BY
J. Mac Donnell
ATTORNEY

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SCANNING MECHANISM FOR RADIO SIGNALING APPARATUS

John R. Hefele, Yonkers, and Charles F. Mattke, Jackson Heights, N.Y., assignors to Bell Telephone Laboratories, Incorporated, New York, N.Y., a corporation of New York

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This invention relates to radio signaling apparatus and more specifically to a scanning mechanism which is well adapted for use, for example, in a radio signaling apparatus of the type disclosed in C. F. Mattke Patent 2,530,890, issued November 21, 1950.

In such apparatus a stationary cylindrically-shaped casing section serves as a support for rotatably mounting a second casing section in the form of a turntable on which an energy reflector is mounted, together with its controlling mechanism operable either independently or in conjunction with the turntable, for imparting a universal movement to the reflector and to the scanning mechanism carried thereby.

The object of the present invention is the provision of a scanning mechanism of the type above referred to in which the conjoint operation of a plurality of independently operable motors is effective to operate eccentric mechanisms for imparting movement to the energy receiving and transmitting end of the wave guide element in a manner to generate scanning fields representing any geometrical figure desired in a simple and accurate manner.

In the drawing:

FIG. 1 is a view of a scanning mechanism shown in assembled position in relation to the energy reflector and a wave guide section extending from the scanning mechanism to a support at the center of the reflector;

FIG. 2 is a view partially in longitudinal section showing the connection of the wave guide with its driving element of the scanning mechanism and its connection in a joint formed with a second wave guide section of the center portion of the energy reflector;

FIG. 3 is a cross-sectional view of the wave guide taken on line 3—3 of FIG. 2;

FIG. 4 is an assembly view of the scanning mechanism shown partly in longitudinal vertical section and with a number of operating parts with portions broken away;

FIG. 5 is a front view shown with a portion of the wave guide disconnected from its cooperating portion at a point passing through line 5—5 of FIG. 4;

FIG. 6 is a view similar to that of FIG. 5 but showing the wave guide turned in a position 180 degrees from that shown in FIG. 5;

FIG. 7 is a cross-sectional view taken on line 7—7 of FIG. 4; and

FIGS. 8, 9 and 10 are diagrammatical views of examples of geometrical scanning fields generated by the wave guide element operated by the cooperating driving elements of the scanning mechanism.

According to the construction of the scanning mechanism of this invention a cylindrically-shaped casing 10 is fitted at both ends with disc-shaped members 11 and 12 secured thereon by a plurality of similar screws 13 while a dust cap P is secured to the end of the casing in position adjacent to the disc 12 as by a plurality of screws 12Y.

A motor M1 and a generator G1 are disposed in side by side relation into the casing 10 with their armature windings keyed on a common shaft 16 supported at one of its ends by a ball bearing 17 fitted in a bore

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in the disc member 12. Into the middle length portion of casing 10 is fitted a stationary disc member 19 formed with hub portions at the center thereof for receiving a pair of ball bearings 20 and 21 serving for supporting the shaft 16 at its middle length portion and one end of the hollow shaft 26, shown in section in FIG. 4, in which the reduced portion of shaft 16 extends for free rotation therein. On the hollow shaft 26 is securely mounted the armature winding of a motor M2, the hub portion 25Y of a disc member 25, and a generator G2, while a ball bearing 24 which is fitted in a bore in the disc 11 serves for rotatably supporting the hub of disc 25. The hollow shaft 26 and shaft 16 are in concentric relation to each other. The end of shaft 16 which projects beyond the disc 25 is further supported in concentric relation to the hollow shaft 26 as shown in FIG. 4 by two ball bearings 27 and 27Y, ball bearing 27 being fitted in a bore in disc 25 and ball bearing 27Y into a bore formed into a mounting block 40Y secured to the face of disc 25 by a plurality of screws SC, FIGS. 4 and 7, while the hollow shaft 26 is held against longitudinal movement in the hub portion 25Y by a ring 24Y threadedly engaging this hub at a point adjacent the disc portion 25 formed with this hub.

On the end of shaft 16 between bearings 27 and 27Y as shown in FIGS. 4 and 7 is keyed a pinion 38 engaging a gear 38Y best seen in FIG. 7 mounted for rotation on a spindle 40X supported at one end by the disc 25 and its opposite end by a plate PL secured to the face of disc 25 by a plurality of screws SC1. The gear 38Y in turn is disposed in meshing relation with the gear toothed portion 36 of a hub member 37 keyed on a spindle 35, the latter having one end supported by a ball bearing 31 fitted in a bore in the disc member 25 and by a ball bearing 32 fitted in a bore in a disc member 28 and retained in position therein by a ring R in turn secured to the disc member 28 by a plurality of screws R1. The disc 28 is secured in spaced relation to disc member 25 by a spacer ring 30 clamped between these discs by a plurality of screws 29 thus forming a casing for housing the gear mechanism consisting of pinion 38, gear 38Y and gear portion 36 of hub 37 above mentioned.

An oil path is formed by a tubing TU fitted in a drilled hole in disc 28 disposed in juxtaposition and in axial alignment to a drilled hole in the block member 40Y and a hole drilled at right angles to tubing TU leading to the periphery of pinion 38 as shown in FIGS. 4 and 7.

The spindle 35 is formed with a disc portion D disposed in eccentric relation thereto. This disc portion is provided with a counterbore for receiving the outer races 50 and 51 of a ball bearing which in cooperation with the curved surface or periphery of bearing 52 forms a so-called self-aligning bearing while the inner periphery of ring 52 cooperates with a cylindrical portion of a spindle 53 to form a ball bearing permitting the longitudinal movement of spindle portion 53 upon the eccentric movement of the latter as will be hereinafter described in detail.

The weight of spindle 53 and that of the end portion of a wave guide 55 secured thereto is balanced by a weight W while a weight W1 which is secured to the disc 28 as by screw 59 shown in FIGS. 5 and 6 serves to counter-balance the eccentric assembly formed by spindle 35 and wave guide 55.

The cylindrical casing 10 is secured to a frame consisting of a pair of clamping rings 62—63 formed integrally with spacer bars 64. The rings 62—63 are each formed with lug portions 65 for securing a corresponding number of angle pieces 67 as shown in FIGS. 1 and 4 which in turn are secured along one of their edges to respective tubings 68, 69, 70 and 71 best seen in FIG.

1 by a plurality of similarly-shaped clamping devices 72. The opposite ends of tunings 68, 69, etc. are secured at the rim portion of an inner energy reflector 73 by a plurality of clamping devices 74, such clamping devices permitting the ready longitudinal adjustment of the scanning mechanism assembly so as to locate the polystyrene windows PW at the focus of the energy reflector, the disc portion CP at this end of the wave guide section 75 being secured to spindle 53 as by a plurality of screws CW.

The opposite end of wave guide section 75 terminates in the form of a disc 76 fitted for free movement in a sleeve portion 77 formed at the center of a spindle 78 forming in cooperation with elements such as 90 mounted on a cylindrical casing 79 a so-called universal joint while the disc portion 76 of wave guide section 75 is disposed in juxtaposition to a disc portion 80 of a second wave guide tubing section 81 having a collar portion 82 fitted in a stationary sleeve 83 projecting from a support, not shown.

The operation of the wave guide section 75 and of the polystyrene windows PW in emitting energy to the reflector is disclosed in Patent 2,422,184, issued June 17, 1947, to C. C. Cutler.

In the operation of the scanning mechanism of this invention the operation of motor M1 is effective to rotate the shaft 16 and through pinion 38, gear 38Y, gear 36 and spindle 35 to cause the spindle 53 and the end of wave guide section 54 secured thereon to generate a scanning field representing a circle of a diameter corresponding to the eccentricity of spindle 53 relative to the turning axis of spindle 35.

Rotation of motor M2 is effective to rotate the hollow shaft 26 and thereby the disc element 25 keyed thereon for rotating the eccentrically disposed spindle 35 in a circle having a diameter corresponding to the eccentricity of this spindle relative to the longitudinal axis of shaft 16. The conjoint operation of motors M1 and M2 turning at the same rate of speed causes the wave guide portion 54 and the polystyrene windows PW to generate geometrical figures representing circles of diameter corresponding to the position of spindle 53 relative to the longitudinal axis of shaft 16 from maximum as when spindle 53 is in the position shown in FIGS. 4 and 5 to minimum as indicated in FIG. 8 when the spindle 53 is in the position shown in FIG. 6, the spindle 35 and the disc 25 rotating in each case at a uniform rate of speed. The generators G1 and G2, which are attached to the same shafts as motors M1 and M2 respectively, generate voltages which are relayed to other equipment, not a part of the present invention and not shown, to indicate the angular positions of the shafts.

The portion 54 of the wave guide may be made to generate an elliptical scan as shown diagrammatically in FIG. 9 by operating the motors M1 and M2 in opposite directions but at the same speed or a spiral 10 as shown diagrammatically in FIG. 10 or any number of desired geometrical figures by varying the relative speed and direction of rotation of the motors.

What is claimed is:

1. A scanning mechanism comprising a pair of motors, a disc member rotated by one of said motors, a spindle mounted on said disc eccentrically thereof and rotated in a planetary movement by the operation of the other of said motors, and a wave guide element carried by said spindle eccentrically thereof to cause said element to generate a scanning field of a geometrical figure depending upon the relative speed and direction of rotation of said motors.

2. A scanning mechanism comprising a pair of motors, a disc member mounted for rotation by the operation of one of said motors, a spindle mounted for rotation on said disc eccentrically thereof, said spindle having a disc portion, a wave guide element mounted on said disc portion eccentrically thereof, a gearing mechanism operatively connecting said spindle to the other of said motors to

cause said wave guide element to generate scanning fields of different geometrical figures depending upon the speed and direction of rotation of said motors.

3. A scanning mechanism comprising an energy reflector having a focus point, a tubular casing, a pair of motors housed in said casing, a first eccentric mechanism actuated by one of said motors, a second eccentric mechanism rotated with said first mechanism and eccentric thereto actuated by the other of said motors, a wave guide element having one of its ends forming the sending and receiving portions of the wave guide connected to said second eccentric mechanism for operation around the focus point of said reflector and its other end extending in juxtaposition to means forming a section of the wave guide, the operation of said motors controlling the operation of said eccentrics to cause the end of the tubing connecting with said eccentrics to generate scanning movements depending upon the speed and direction of rotation of said motors relative to each other.

4. A scanning mechanism comprising a cylindrically-shaped tubular casing, a pair of motors mounted in coaxial relation to each other in said casing, one of said motors having a hollow armature shaft, the armature shaft of the other of said motors projecting into said hollow shaft, a disc member mounted on said hollow shaft for rotation therewith, a pinion carried by said projecting shaft, a spindle eccentrically mounted on said disc, said spindle having a disc portion coupled to one end thereof for rotation therewith, a gear carried by said spindle, another gear operatively connecting the gear carried by said shaft and the gear carried by said spindle for imparting a planetary movement to said spindle upon the conjoint operation of said motors, and a wave guide element carried eccentrically by said disc portion.

5. A scanning mechanism comprising a cylindrically-shaped tubular casing, a pair of motors mounted in said casing in side-by-side and in coaxial relation to each other, one of said motors having a hollow armature shaft, the armature shaft of the other of said motors projecting into said hollow shaft, a plurality of means in said casing for rotatably supporting said shafts, two of said supporting means forming end closures for said casing, a disc member having a hub portion mounted on said hollow shaft for rotation therewith, another disc, a spacer ring, means for securing said spacer ring and the last-mentioned disc to said disc member, a rotatable spindle, eccentrically carried by said disc member and the last-mentioned disc, a gearing mechanism operatively connecting said projecting shaft to said spindle, and a wave guide element mounted eccentrically on said spindle for generating scanning movements representing geometrical figures depending upon the conjoint operation of said motors in speed and direction of rotation.

6. A scanning mechanism comprising an energy reflector, a cylindrical tubular casing, a pair of motors housed in said casing, a first eccentric mechanism actuated by one of said motors, a second eccentric mechanism rotatable with said first mechanism and eccentric thereto actuated by the other of said motors, a wave guide element having one of its ends forming the sending and receiving portions of the wave guide attached to said second eccentric mechanism, the other end of said wave-guide element extending in juxtaposition to the end of a second wave guide element disposed at the center portion of said reflector and a mounting frame for said casing secured to said reflector.

7. A scanning mechanism comprising a cylindrically-shaped tubular casing, a disc member secured at each end of said casing, a motor and a generator mounted in said casing, a common armature shaft for said motor and said generator, said shaft having one of its ends supported by one of said discs, another motor having a hollow armature shaft, a disc member mounted in said casing at its middle length portion having means for supporting one end of said hollow shaft, said common shaft having

its opposite end extending into said hollow shaft in concentric relation thereto, a second generator mounted in said casing having an armature shaft in the form of a sleeve keyed on said hollow shaft for rotation by the operation of said second motor, a disc member mounted on said hollow shaft for rotation therewith, a spindle eccentrically carried by said disc, a gearing mechanism operatively connecting said common shaft to said spindle, and a wave guide element mounted eccentrically on said spindle for generating scanning fields having geometrical fig-

ures dependent upon the speed and direction of rotation of said shafts.

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