Sept. 12, 1950 W. E. KOCK 2,522,125

ANTENNA DRIVING MECHANISM

Filed Dec. 29, 1945 5 Sheets-Sheet 1

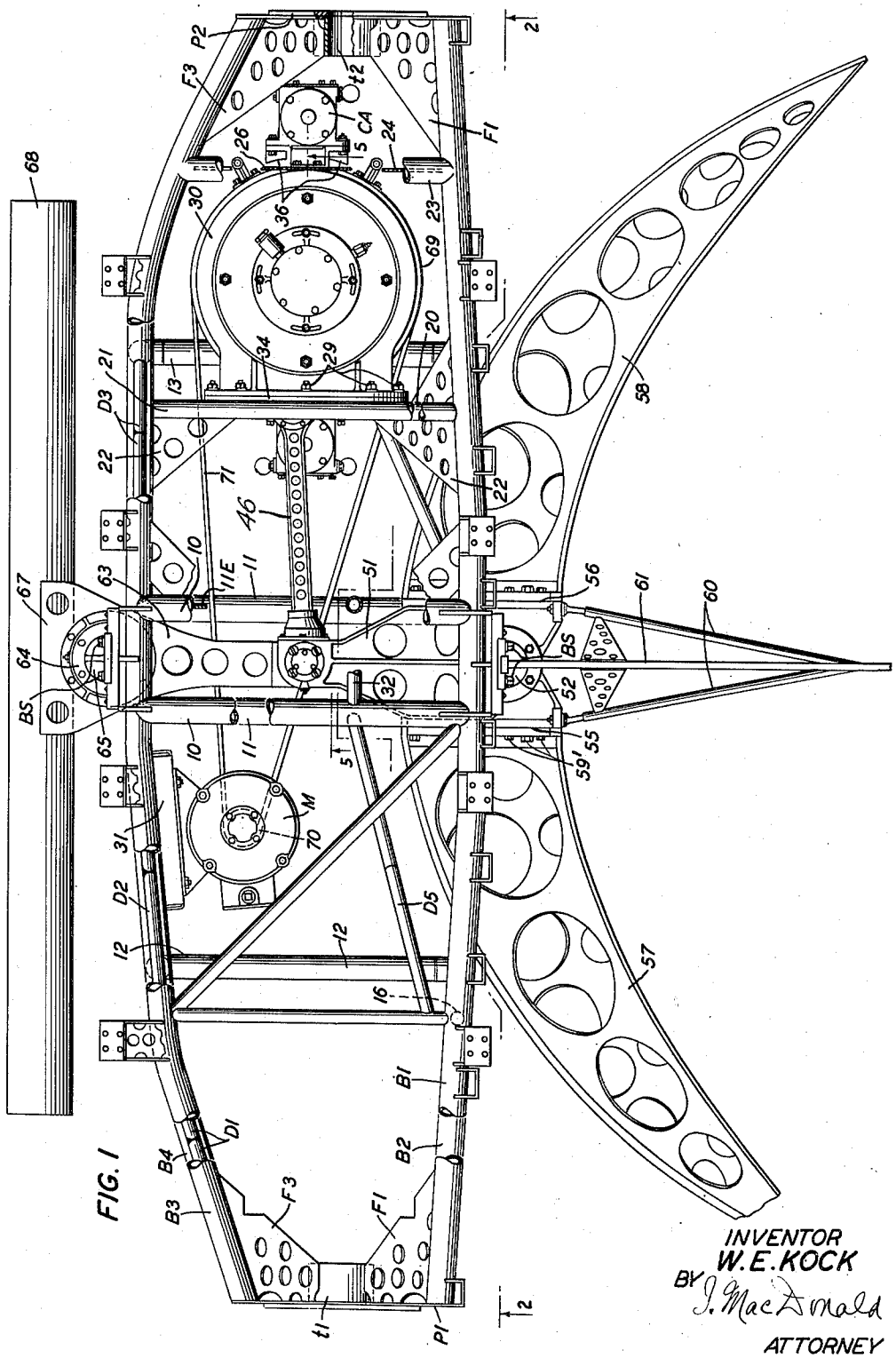


FIG. 1

INVENTOR
W. E. KOCK
BY J. MacDonald
ATTORNEY

Sept. 12, 1950 W. E. KOCK 2,522,125

ANTENNA DRIVING MECHANISM

Filed Dec. 29, 1945 5 Sheets-Sheet 2

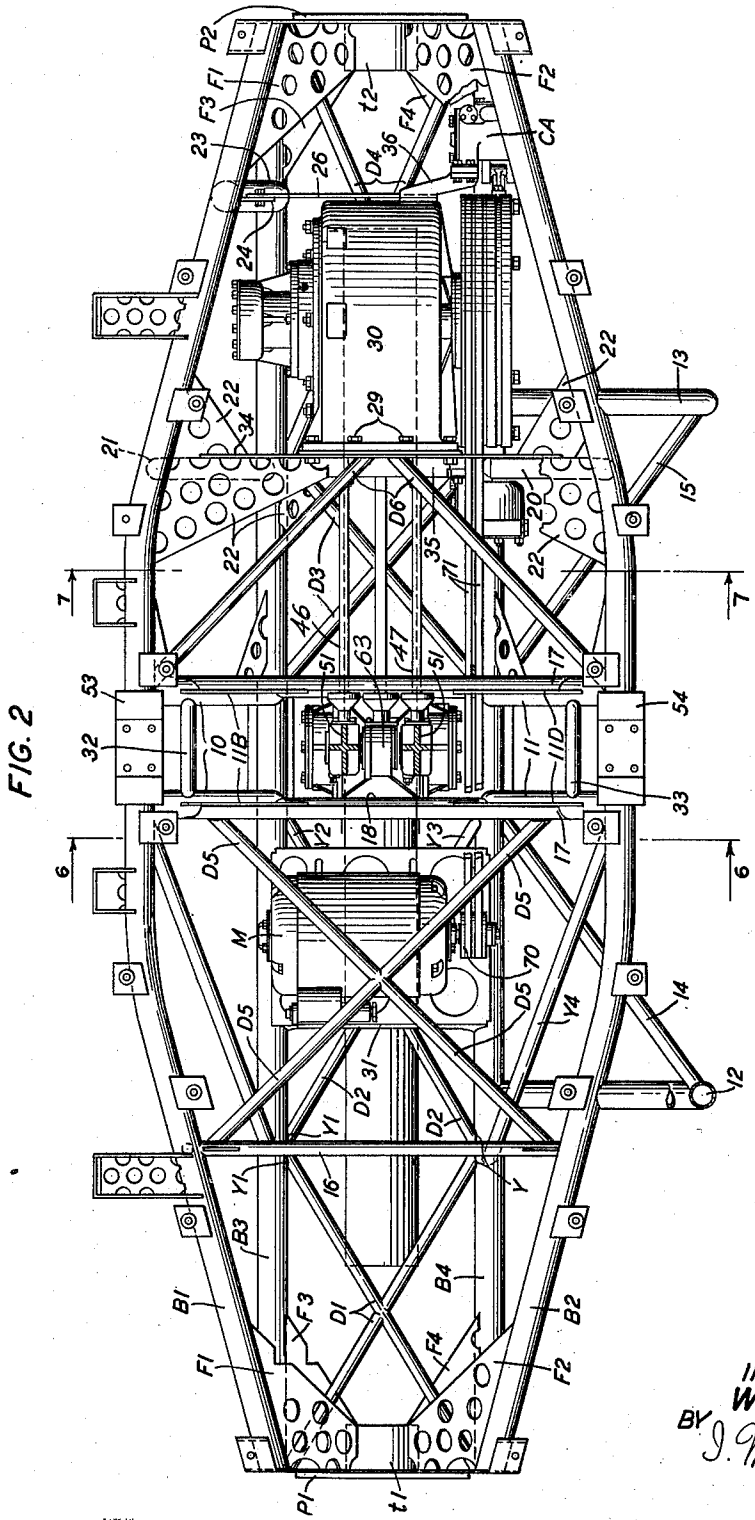


FIG. 2

INVENTOR
W. E. KOCK
BY J. MacDonald
ATTORNEY

Sept. 12, 1950 W. E. KOCK 2,522,125

ANTENNA DRIVING MECHANISM

Filed Dec. 29, 1945 5 Sheets-Sheet 3

FIG. 3

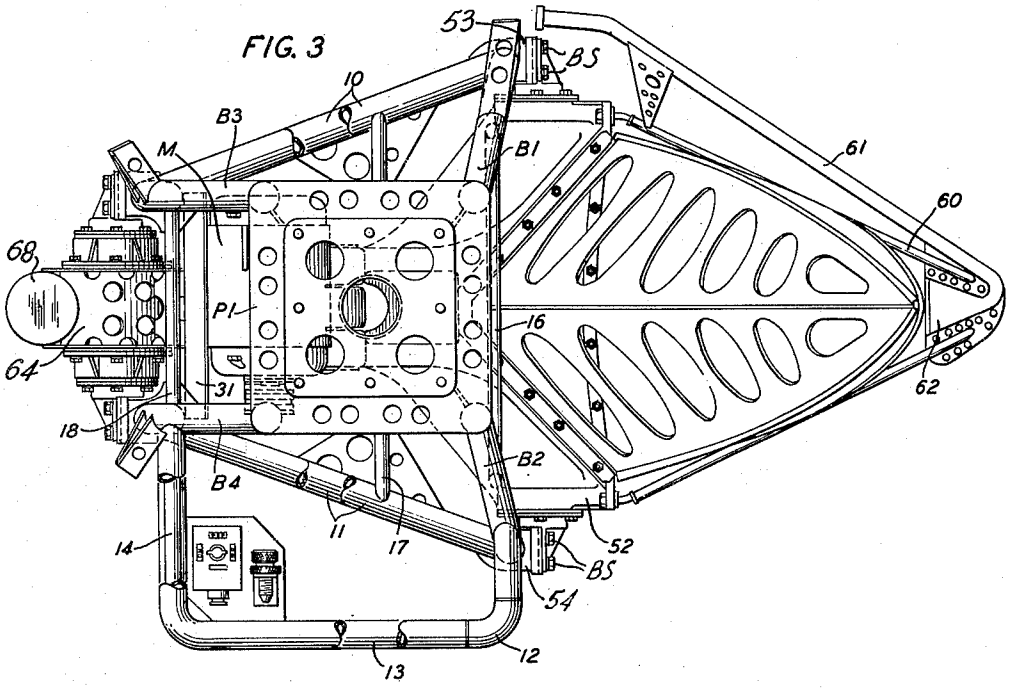
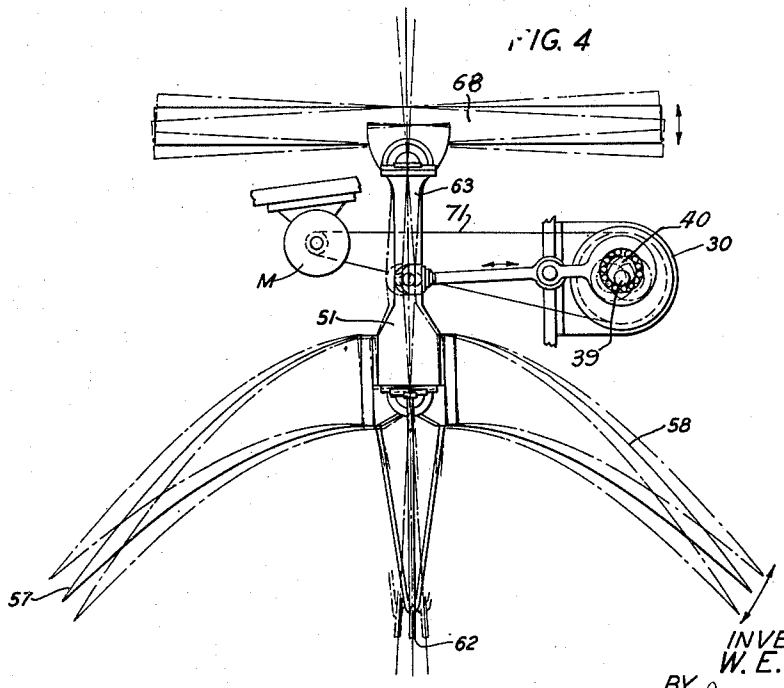


FIG. 4



INVENTOR
W. E. KOCK
BY J. MacDonald
ATTORNEY

Sept. 12, 1950 W. E. KOCK 2,522,125

ANTENNA DRIVING MECHANISM

Filed Dec. 29, 1945 5 Sheets-Sheet 4

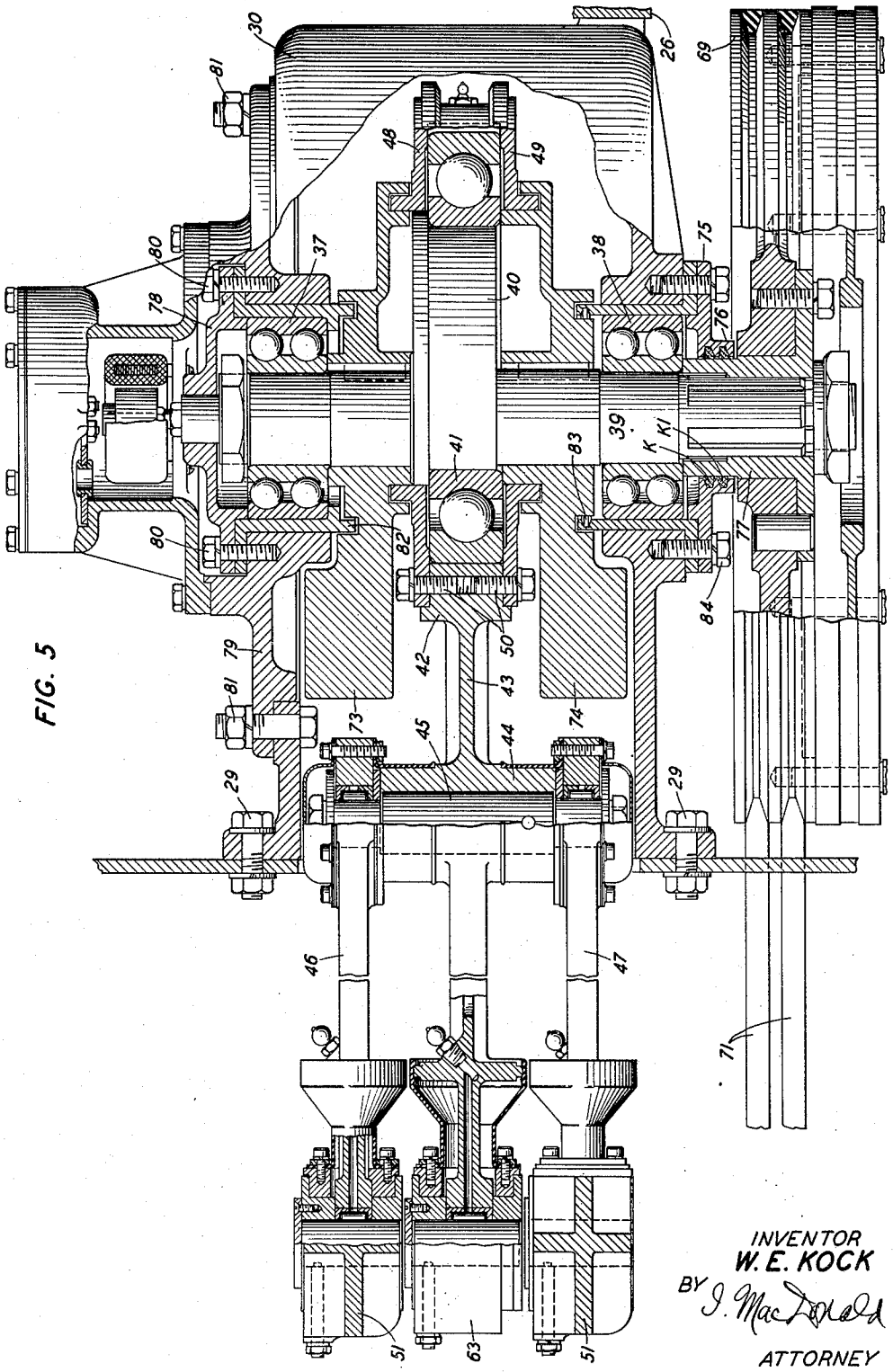


FIG. 5

INVENTOR
W. E. KOCK
BY J. MacDonald
ATTORNEY

Sept. 12, 1950 W. E. KOCK 2,522,125

ANTENNA DRIVING MECHANISM

Filed Dec. 29, 1945 5 Sheets-Sheet 5

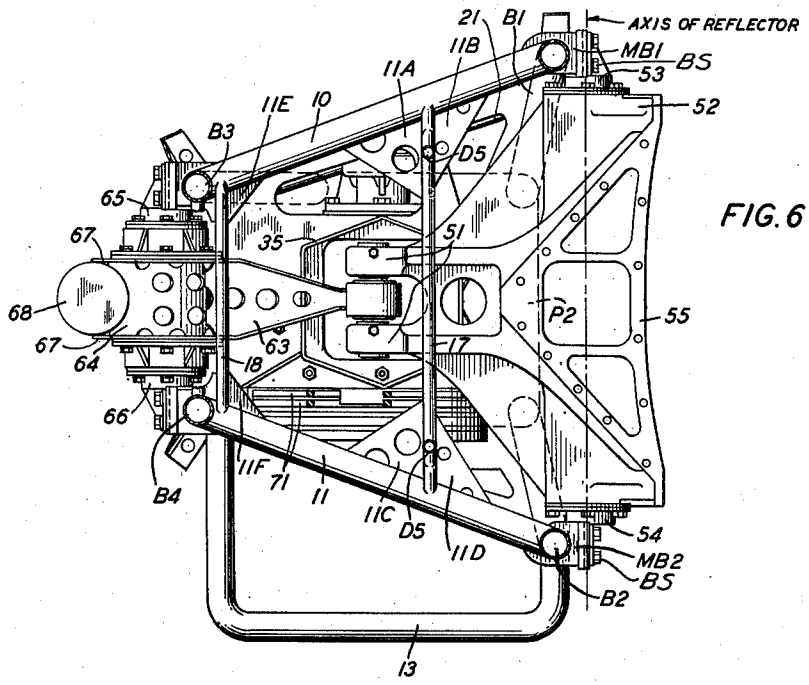


FIG. 6

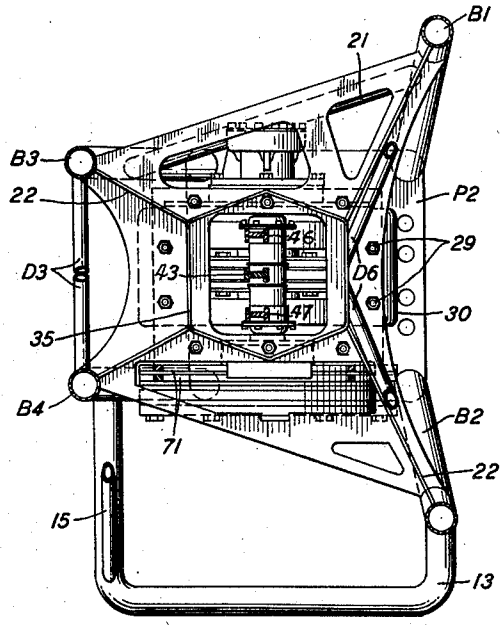


FIG. 7

INVENTOR
W. E. KOCK
BY J. MacDonald
ATTORNEY

Patented Sept. 12, 1950 2,522,125

UNITED STATES PATENT OFFICE

2,522,125

ANTENNA DRIVING MECHANISM

Winston E. Kock, Middletown, N. J., assignor to Bell Telephone Laboratories, Incorporated, New York, N. Y., a corporation of New York

Application December 29, 1945, Serial No. 638,349

2 Claims. (Cl. 250—33,65)

1

This invention relates to radio signaling apparatus and more specifically to a driving mechanism for imparting a rocking movement to the reflector and antenna of such apparatus.

The object of this invention is the provision of a driving mechanism of the type above referred to which will be simple, positive in operation and which will be substantially free of damaging vibrations while in operation.

In the drawing:

Fig. 1 is a top assembly view showing a number of operating parts with portions broken away;

Fig. 2 is a front assembly view showing a number of operating parts in vertical section taken on line 2—2 of Fig. 1;

Fig. 3 is an end view shown with a number of tubing members comprised in the mechanism supporting frame with portions broken away;

Fig. 4 is a schematic view;

Fig. 5 is a partial view shown in vertical longitudinal section taken on line 5—5 of Fig. 1;

Fig. 6 is a vertical cross-section view taken on line 6—6 of Fig. 2; and

Fig. 7 is a vertical cross-section view taken on line 7—7 of Fig. 2.

In the radio signaling apparatus of this invention, a mounting frame for the driving mechanism is provided which consists of four main tubular members B1, B2, B3 and B4 bent in a manner to position their opposite ends in registry with the corners of two square-shaped plates P1 and P2 shown in Figs. 1, 2 and 3 to which they are secured, as by welding. Tubings t1 and t2 are fitted into centrally located openings in the plates P1 and P2 and welded perpendicularly thereto, the plates P1 and P2, the ends of main tubings B1, B2, B3 and B4 and tubings *t1* and *t2* being in turn welded to the edges of similarly shaped reinforcing fin members or angle plates F1, F2, F3 and F4, best seen in Figs. 1 and 2.

The main tubings B1 and B3 are held in horizontal spaced relation to each other at their middle length portions by a pair of parallelly disposed tubings 10, while the main tubings B2 and B4 are held in horizontal spaced relation to each other by a pair of tubings 11 secured thereto as by welding. The pairs of tubings 10 and 11, as best seen in Figs. 3 and 6, and therefore the main tubings B1, B2 and B3, B4 are held in vertical spaced relation to each other by pairs of tubings 17 and 18 welded at their end portions to tubings 10 and 11. Angle-shaped plates 11A, 11B and 11C, 11D, best seen in Fig. 6, are welded at their edges to the spacer tubings 10 and 11 and to the spacer tubings 17 for reinforcing them at their connecting points with tubings 10 and 11, while other angle-shaped plates as 11E and 11F are welded at their edges to the spacer tubings 10 and 11 and to the spacer tubings 18 for reinforcing such tubings at their connecting points.

A base is formed by two substantially U-shaped tubings 12 and 13 welded at their ends to main

2

tubings B2 and B4. Tubings 12 and 13 are held in spaced relation at their lower disposed portions by two diagonally disposed tubings 14 and 15, best seen in Figs. 2, 3 and 7 welded at one of their end portions to the U-shaped tubings 12 and 13 and their adjacently disposed ends to the main tubing B4.

Main tubings B1 and B2 are held in vertical spaced relation to each other at the point adjacent to the U-shaped base tubing 12 by a tubing 16 welded thereto, while a cross-shaped reinforcing element D5, best seen in Figs. 1 and 2, constructed of tubing, diagonally connects the ends of tubing 16 and tubing 17. Similarly, cross-shaped reinforcing elements D1 and D2 diagonally connect with the end of main tubings B3 and B4, adjacent plate P1 and spacer tubing 18, at points Y, Y1, Y2, Y3. A tubing Y4, best seen in Fig. 2, is welded at its ends to the main tubings B2 and B4 in diagonal relation thereto.

A vertically disposed base 31 is welded at two of its edges to the main tubings B3 and B4 to serve as a spacer between such tubings and for mounting a motor M provided for a purpose which will be hereinafter described in detail. The parallelly disposed spacer tubings 10 and 11, which are welded at their ends to main tubings B3 and B4, are reinforced at points adjacent their ends by tubings 32 and 33, respectively, best seen in Figs. 1 and 2, while the main tubings B3 and B4 are further held in spaced relation by two cross elements D3 and D4, having their ends secured thereto, as by welding. Main tubings B1 and B3 are held in spaced relation to each other by a tubing 21, while tubings B2 and B4 are held in spaced relation by a tubing 20. Tubings 20 and 21 support a plate 34 to which a rim or flange formed at the open end of the casing 30 is secured, as by a number of bolts 29, best seen in Figs. 2 and 5, this casing being supported at a point opposite its open end by a plate 26 having its upper disposed edge secured to a strip member 24, edge welded to a spacer tube 23. Tube 23 has its opposite ends welded to the main tubings B1 and B3. Fin members, such as 22, are welded to the tubings B1, B2, B3 and B4, to the plate 34, and to a hexagonally-shaped rim 35, best seen in Figs. 2 and 7, the latter having one edge welded to the mounting plate 34. Plate 26 is provided, as shown in Figs. 1 and 2, with a pair of arms 36 serving for mounting the casing CA containing a switching device, not shown, operated by the rotation of a flywheel 69 carried by a shaft 39, best seen in Fig. 5, rotatably mounted in casing 30 as will be hereinafter described in detail.

The shaft 39 is formed with an eccentric 40 which is fitted at its periphery with a ball bearing 41, the outer ring of which engages the head 42 of a connecting rod 43 having at a point substantially one third from its head portion 42 a hub element 44 fitted with a pin 45, serving as a pivot

for two connecting rods 46 and 47. The head 42 of connecting rod 43 is held in place on the ball bearing 41 by a pair of rings 48 and 49 secured to the head 42 as by a number of screws 50, while the shaft 39 is mounted for rotation on ball bearings 37 and 38 fitted in casing 30.

The connecting rods 46 and 47, best seen in Figs. 1, 2 and 5, which are of similar length, connect with a duplex arm 51 extending laterally from a hub 52 pivoted on two supports 53 and 54 secured to base members MB1 and MB2, as by a number of bolts BS, the base members being in turn welded to the main tubings B1 and B2.

The hub 52 is provided with diametrically opposite triangularly-shaped rim portions 55 and 56, serving for securing, as by a number of bolts 59', the sections 57 and 58 of a reflector having the form of a paraboloid of revolution cut to an elliptical shape substantially 8 feet long and 2 feet wide at its middle portion. Two rods 60 having one of their ends bolted to the hub 52 serve for supporting a wave guide in the form of a tubing 61 which is jointed to a complemental tubing, not shown, at a point in vertical alignment with the pivotal center of hub 52. Horn portion 62 of the wave guide 61, see Fig. 3, is disposed at the focus of the reflector formed by the sections 57 and 58 by the rods 60 as above described.

The connecting rod 43 is connected to the free end portion of an arm 63 laterally extending from a hub 64 pivoted on ball bearings, not shown, fitted in supports 65 and 66 best seen in Fig. 6 mounted on main tubings B3 and B4. The arm 63, which is formed of sheet steel, has plate portions 67, Figs. 1 and 6, serving for securing, as by welding, an oblong shaped counterweight 68 provided for dynamically balancing the reflector sections 57–58 mounted on the pivoted hub 52.

In the mechanism above described, the applicant discovered that for vibrationless operation the longitudinal axis of the pivots which connect the duplex arm 51 of the reflector to the connecting rods 46 and 47, and the longitudinal axis of the pivot which connects the free end of connecting rod 43 to the free end of arm 63 of the counterweight must all be disposed in a common center line when the counterweight and the reflector are in parallel relation to each other.

On shaft 39 at the lower disposed end thereof, as shown in Fig. 5, is mounted a duplex grooved pulley or flywheel 69, operatively connected to a similarly grooved pulley 70 best seen in Fig. 2 keyed on the armature shaft of motor M by a pair of belts 71 of trapezoidal cross-section.

On shaft 39 are keyed the counterweights 73 and 74, provided for balancing the connecting rods 43, 46 and 47. These counterweights are each provided with a circular groove into which extend the edges of respective bushings 82 and 83 to serve as barriers for preventing dust particles and other foreign matter reaching the ball bearings 37 and 38, while a cover plate 75 secured to the casing 30, as by a number of screws 84, is provided with a hub portion 76, formed with grooves for receiving packing rings K and K1 fitted around the hub 77 to protect the external side of the bearing 38. The hub 77 serves to secure the flywheel 69 on shaft 39. Similiarly, the ball bearing 37 is protected from dust particles by a cap 78 secured to a section 79 of casing 30 by a plurality of screws 80, while casing section 79 is secured to casing 30 by a plurality of bolts 81.

In the radio signaling apparatus of this invention, the operation of motor M is transmitted to the eccentric shaft 39 by the belts 71. The rotation of shaft 39 and the eccentric 40 formed therewith is effective to impart a rocking motion to the reflector formed as above mentioned by sections 57 and 58 and simultaneously to the counterweight 68 which accurately balances the antenna reflector with the result that no destructive vibrations are imparted to the tubular frame thus constructed and to the electrical apparatus mounted thereon.

What is claimed is:

1. In a radio apparatus, a tubular frame, a motor secured to said frame, an eccentric actuated by said motor, a casing for housing said eccentric secured to said tubular frame, an elliptically shaped reflector mounted for rocking movement on said frame, an oblong shaped counterweight for balancing said reflector mounted for rocking movement on said tubular frame so that its longitudinal axis at all positions lies in a plane defined by the movement of the longitudinal axis of the reflector, a first arm rigidly connected to said reflector, a second arm rigidly connected to said counterweight, and a system of rods pivotally connecting said eccentric to said first and second arms, said rods having the axes of their connecting pivots with said first and second arms lying on a common line when the longitudinal axes of said reflector and said counterweight are in parallel relation to each other.

2. In a radio signaling apparatus, a tubular mounting frame, an elliptically shaped reflector, and a counterweight for dynamically balancing said reflector, a pivot for said reflector, a pivot for said counterweight, said pivots being secured on said frame with their axes in parallel relation to each other, a casing mounted on said frame, a shaft having an eccentric mounted for rotary movement in said casing, an arm carried by the pivot of said counterweight, a rod pivotally connecting said eccentric to said arm, a pivot carried by said rod, a pair of arms carried by the pivot of said reflector, a pair of connecting rods mounted on the pivot carried by the first-mentioned rod pivotally connecting with the arms carried by the pivot of said reflector, the axes of the connecting pivots of each of said arms with each of said rods lying on a common center line when the longitudinal axes of said reflector and said counterweight are in parallel relation to each other, and a motor for actuating said eccentric to cause a rocking movement of said reflector and said counterweight in opposite directions to each other.

WINSTON E. KOCK.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
66,623	Pelton	July 9, 1867
2,215,785	Gallant et al.	Sept. 24, 1940
2,221,483	Kennelly	Nov. 12, 1940
2,257,320	Williams	Sept. 30, 1941
2,407,310	Lundy et al.	Sept. 10, 1946
2,408,825	Varian et al.	Oct. 8, 1946
2,410,827	Langstroth et al.	Nov. 12, 1946
2,412,631	Rice	Dec. 17, 1946

FOREIGN PATENTS

Number	Country	Date
302,793	Great Britain	Dec. 27, 1928