

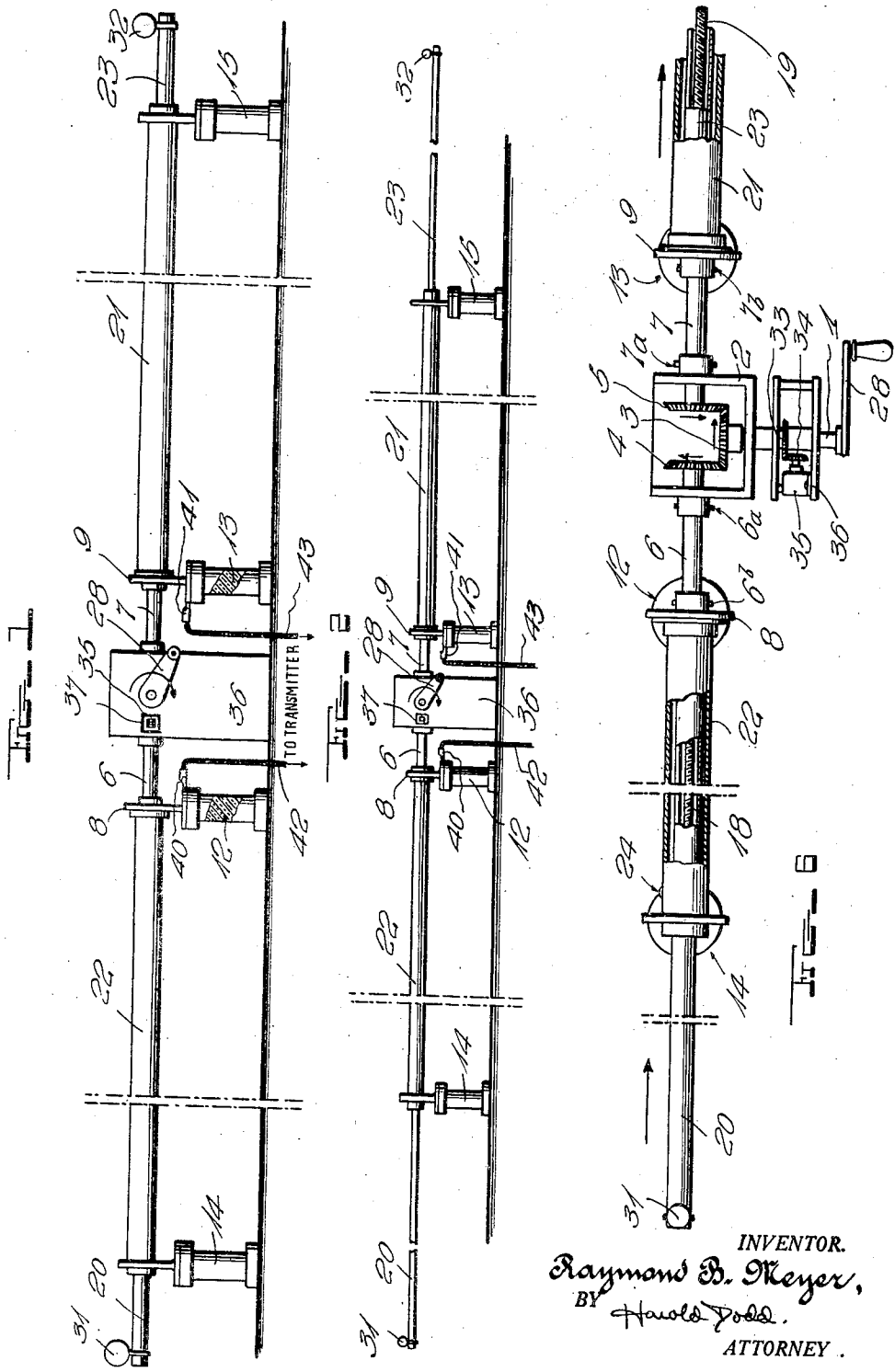
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R. B. MEYER
ANTENNA SYSTEM

1,911,234

Filed March 8, 1930

2 Sheets-Sheet 1



INVENTOR.
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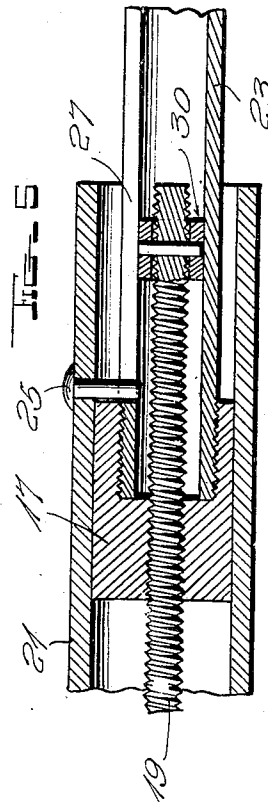
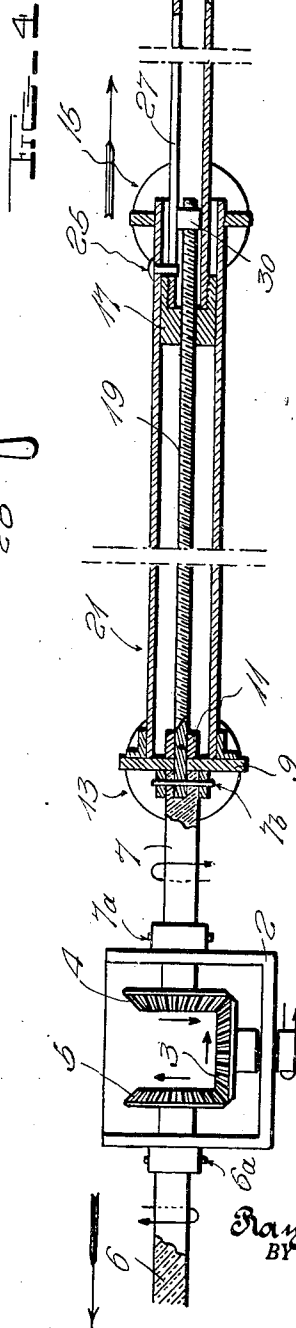
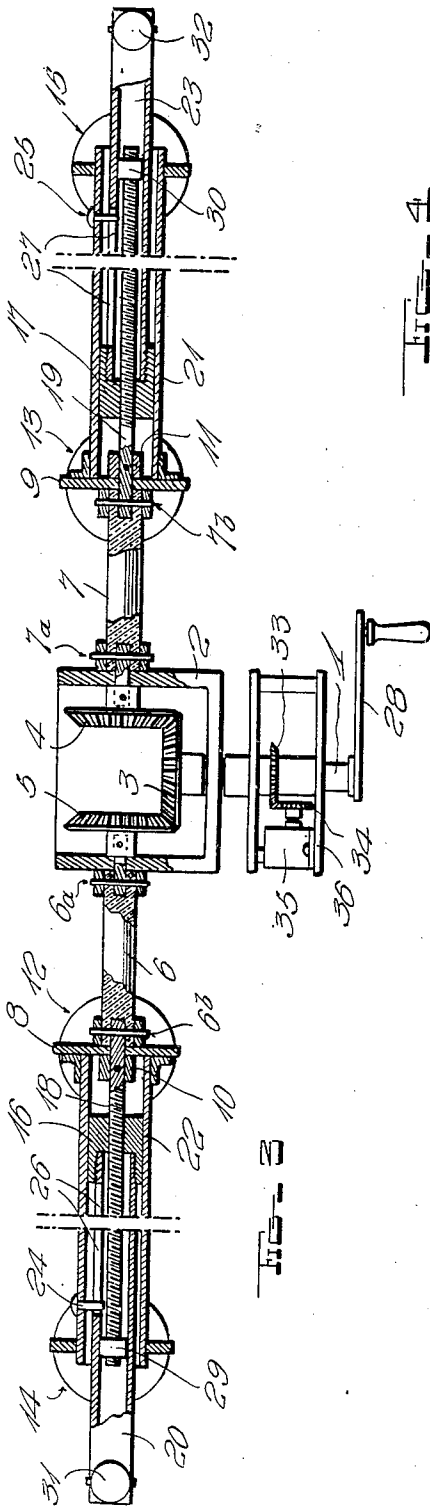
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1,911,234

ANTENNA SYSTEM

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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

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ANTENNA SYSTEM

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The object of my invention is to provide a construction of high frequency doublet antenna system having means for accurately adjusting the capacity of the doublet.

Another object of my invention is to provide a construction of doublet antenna system for high frequency radio communication systems having means for indicating the condition of resonance in the antenna for the accurate adjustment of the antenna for operation at selected high frequencies.

Other and further objects of my invention reside in the construction of high frequency doublet antenna system described in the following specification and illustrated in the accompanying drawings in which:

Figure 1 is a side elevation of an antenna constructed in accordance with my invention showing the antenna in a minimum capacity position; Fig. 2 is a similar view showing the antenna in a maximum capacity position; Fig. 3 is a top plan view on a larger scale with parts broken away and illustrated in horizontal section; Fig. 4 is a similar view showing the antenna extended; Fig. 5 is a detailed horizontal section showing more particularly the means for limiting the extension of the antenna; and Fig. 6 is a plan view partially in section showing a modified form of the antenna system.

My invention is directed to a doublet system for operation at extremely high frequencies. In high frequency doublet antenna systems, I have found it is necessary in order to secure maximum efficiency, that the doublet antenna system lend itself readily to accurate adjustment in capacity. It is also essential that the constants of the antenna be maintained accurately at any of the selected settings. It is also important that the antenna system lend itself readily to an accurate resetting of any predetermined adjustment. The antenna system of my invention provides all of these features which I have found to be necessary in the proper functioning of a communication system at extremely high frequencies.

The doublet antenna system of my invention is connected to the output of a high

frequency radio transmitter by any of the well known methods of coupling either directly or through the medium of a high frequency transmission line. I provide mechanical means for accurately setting the antenna system to a selected capacity value and resetting the antenna to that capacity value to adjust the system for operation at any desired frequency. I provide means in association with the antenna system for indicating the condition of resonance of the antenna for the selected frequency setting.

Referring to the drawings in more detail, reference character 1 designates an operating shaft of insulation material which passes through a frame structure 2 and is rotatable with respect thereto to drive bevel gear 3. Frame structure 2 provides a bearing support in which beveled gears 4 and 5 are suitably journaled in mesh with gear 3. Extending in the same longitudinal line from support 2 and connected to bevel gears 4 and 5, respectively, I provide insulated shaft members 7 and 6 pinned at 7a and at 6a to the stub shafts on rotatable bevel gears 4 and 5, respectively. The antennae are supported on insulated pedestals which I have designated at 12, 13, 14 and 15. The insulated pedestals 12 and 14 serve to support the tubular member or antenna 22 carried by a head 8 at the end adjacent the operating member which is erected upon pedestal 12. The tubular member or antenna 21 is supported by head 9 on pedestal insulator 13 in a position extending in the same longitudinal axis as the axis of the tubular member or antenna 22. A longitudinally extending screw threaded drive shaft 18 is centrally positioned within the tubular antenna 22 and is connected by means of pins 6b with insulated shaft 6. Drive shaft 18 is provided with a bushing 10 secured thereon on the opposite side of head 8 whereby the screw threaded shaft 18 is maintained in a selected position at the same time that the shaft is free to revolve under control of beveled gear 5. A sleeve member 16 is telescopically positioned within tubular member 22 and is free to be longitudinally moved therein under control of the screw threaded

drive shaft 18. The sleeve 16 is screw threaded in the nature of a socket to receive the tubular member 20 which is telescopically housed within tubular member 22. A collar 29 is pinned to the end of screw threaded shaft 18 and centrally supports the shaft 18 within the tubular member 20. A pin 24 is carried by tubular member 22 and projects inwardly through a slot 26 formed in tubular member 20 permitting tubular member 20 to be projected longitudinally in accordance with the movement of sleeve 16 along screw threaded shaft 18 without being subjected to a twisting action with respect to tubular member 22. The antenna 21 provides a housing for screw threaded drive shaft 19 which is pinned at 7b to insulated shaft 7. A thrust collar 11 is pinned on shaft 19 permitting rotatable movement of shaft 19 within tubular member 21 under control of drive gear 4. The screw threaded sleeve 17 is driven along screw threaded shaft 19 in accordance with rotary movement of drive gear 4. Sleeve 17 carries tubular member 23 telescopically within tubular member 21. Pin 25 projects through tubular member 21 into slot 27 in tubular member 23 enabling tubular member 23 to be longitudinally adjusted telescopically within tubular member 21.

By rotating crank 28 and rotatably driving shaft 1, rotary movement is imparted to gear 3 which in turn imparts rotary movement to gears 4 and 5 for adjusting the position of the telescopic sections of the antennae 20 and 23 with respect to the sections of the antennae shown at 22 and 21. The dimensions of the antennae 21, 22 and 20 and 23 and of shafts 18 and 19 may be of any desired length and diameter, while the ratio existing between gears 4 and 5 and 3 may be chosen to give any desired speed of adjustment. The threaded shafts 18 and 19 may be designed so as to cause both sections of the doublet to increase or decrease in length simultaneously, or may be made so that one section of the doublet increases in length while the other decreases. In normal operation, adjustments are so made that the sections of the doublet increase in length simultaneously and decrease in length simultaneously. 14 and 15 designates additional insulated supports should their presence be desirable or necessary.

On the ends of the outer sections of the doublet, I provide glow discharge devices 31 and 32 in the form of neon filled bulbs which I utilize for the purpose of indicating a resonance condition in the antennae for the desired transmitting frequency. I find that the neon filled lamps provide a simplified means for checking the resonance condition in the antennae and readily show the presence of a node under transmitting conditions. The neon bulbs are secured adjacent

the extreme ends of the sections 20 and 23 by a ring member which encircles the antennae sections to secure the neon bulb in position. Glow discharge devices 31 and 32 will glow when the proper voltage is applied. The system is arranged so that these tubes will glow when a voltage loop exists at the end of the doublet section which occurs when the length of the doublet section is adjusted for resonance. In order to provide for accurate resetting of the adjustable doublet, a counter 35 is connected to the actuating mechanism driven by handle 28 through gears 33 and 34. 36 represents a panel, which may be the panel of the radio transmitter in which a window 37 is provided for sighting the dial of counter 35.

Connections are made to the doublet by connecting lugs which I have designated at 40 and 41 connecting to leads 42 and 43, respectively, to the transmitter. Any of the well-known methods of coupling may be employed for interconnecting the doublet with the radio transmitter either directly or through the medium of a radio frequency transmission line.

Where it is desired to operate the doublet by a shift of the antennae simultaneously in the same direction instead of simultaneously projecting and collapsing the antennae, the system shown in Figure 6 may be employed in which screw threaded drive shaft 19 is screw threaded in a direction opposite to the position of the screw threads on drive shaft 18, so that rotary movement of shaft 1 will impart movement to the telescopic sections 20 and 23 in the same direction.

I have found the antennae system of my invention particularly adapted for signalling over a range of 30,000 to 75,000 kilocycles, although the principles of my invention may be employed for communication outside of this range.

I desire that it be understood that further modifications may be made and that no limitations upon my invention are intended other than are imposed by the scope of the appended claims.

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

1. In an antenna doublet system for high frequency signaling, a pair of radiating elements, each of said radiating elements consisting of a plurality of telescoping members, individual means for each of said radiating elements for controlling the extension of the telescoping members thereof, and a common control means for cooperatively actuating said individual controlling means for maintaining equal extensions of the telescoping members of each of said radiating elements.

2. In an antenna doublet system for high frequency signaling, a pair of radiating ele

ments, each of said radiating elements consisting of a plurality of telescoping members, individual means for each of said radiating elements for controlling the extension of the telescoping members thereof, a common control means for cooperatively actuating said individual controlling means for maintaining equal extensions of the telescoping members of each of said radiating elements, and an indicator actuated by said common control means for indicating the extension of said telescoping members.

3. An antenna system for high frequency signaling comprising sets of multiple telescopically disposed sections extending in opposite directions, a connection to one section of each of said sets for impressing high frequency signaling energy thereon, drive means extending through one of said sections, an insulated shaft connected to said drive means, and means disposed intermediate said sets of sections, for imparting rotary movement to said insulated shafts for controlling the adjustment of said sections for correspondingly adjusting the effective capacity of said antenna system.

4. An antenna for high frequency signaling comprising sets of telescopically disposed tubular sections extending in opposite directions, individual means for each set passing through one of said sections for controlling the movement of another of said sections within said first mentioned section, insulated shafts connected respectively to each of said means, common means disposed intermediate said sets of sections for transmitting rotary movement to said insulated shafts for adjusting the position of said sections with respect to each other, and a connection to the first mentioned section of each set for impressing high frequency signaling energy on said antenna system.

5. An antenna for high frequency signals comprising a pair of longitudinally extending antenna elements insulated one from another, each of said antenna elements comprising a plurality of telescopically disposed tubular sections, rotary drive shafts extending through said sections for controlling the projection or collapse of said sections with respect to each other, individual gears carried respectively by said shafts, a common driving gear disposed between the adjacent ends of said rotary drive shafts for cooperatively actuating the gears of said drive shafts, and connections for impressing high frequency signaling energy upon each of said antenna systems.

6. In a high frequency signaling system, antenna elements comprising a plurality of longitudinally extending capacity systems, each of said capacity systems being adjustable to control the effective capacity area thereof, means disposed between and connected to said capacity systems for si-

multaneously controlling an adjustment of capacity in each of said systems, and connections for impressing high frequency signaling energy upon said capacity systems at adjacent points thereof.

7. In a high frequency signaling system, doublet antenna elements comprising telescopically arranged capacity areas, means for adjusting said capacity areas with respect to each other for controlling the effective capacity area of said antenna elements, a rotary drive gear disposed between the capacity areas, and adapted to cooperatively actuate said capacity areas, insulation means interconnecting said rotary drive gear with the capacity areas, whereby the effective capacity of said capacity areas may be simultaneously adjusted, and connections for impressing high frequency energy upon said capacity areas.

8. In an antenna doublet system for high frequency signaling, a pair of radiating elements, each of said radiating elements consisting of a plurality of telescoping members, individual means for each of said radiating elements for controlling the extension of the telescoping members thereof, individual gears carried by each of said individual controlling means for respectively actuating said individual controlling means, and a common control gear adapted to actuate each of said individual gears for cooperatively actuating said individual controlling means for maintaining equal extensions of the telescoping members of each of said radiating elements.

9. In an antenna doublet system for high frequency signaling for use with a transmitter remote from said doublet system, a pair of radiating elements, each of said radiating elements consisting of a plurality of telescoping members, individual means for each of said radiating elements for controlling the extension of the telescoping members thereof, a common control means for cooperatively actuating said individual controlling means for maintaining equal extensions of the telescoping members of each of said radiating elements, and connections extending outwardly from said doublet system to said remote transmitter.

RAYMOND B. MEYER.