May 9, 1933. H. O. PETERSON 1,908,536

ANTENNA INSULATION

Filed Dec. 21, 1929

Fig. 1

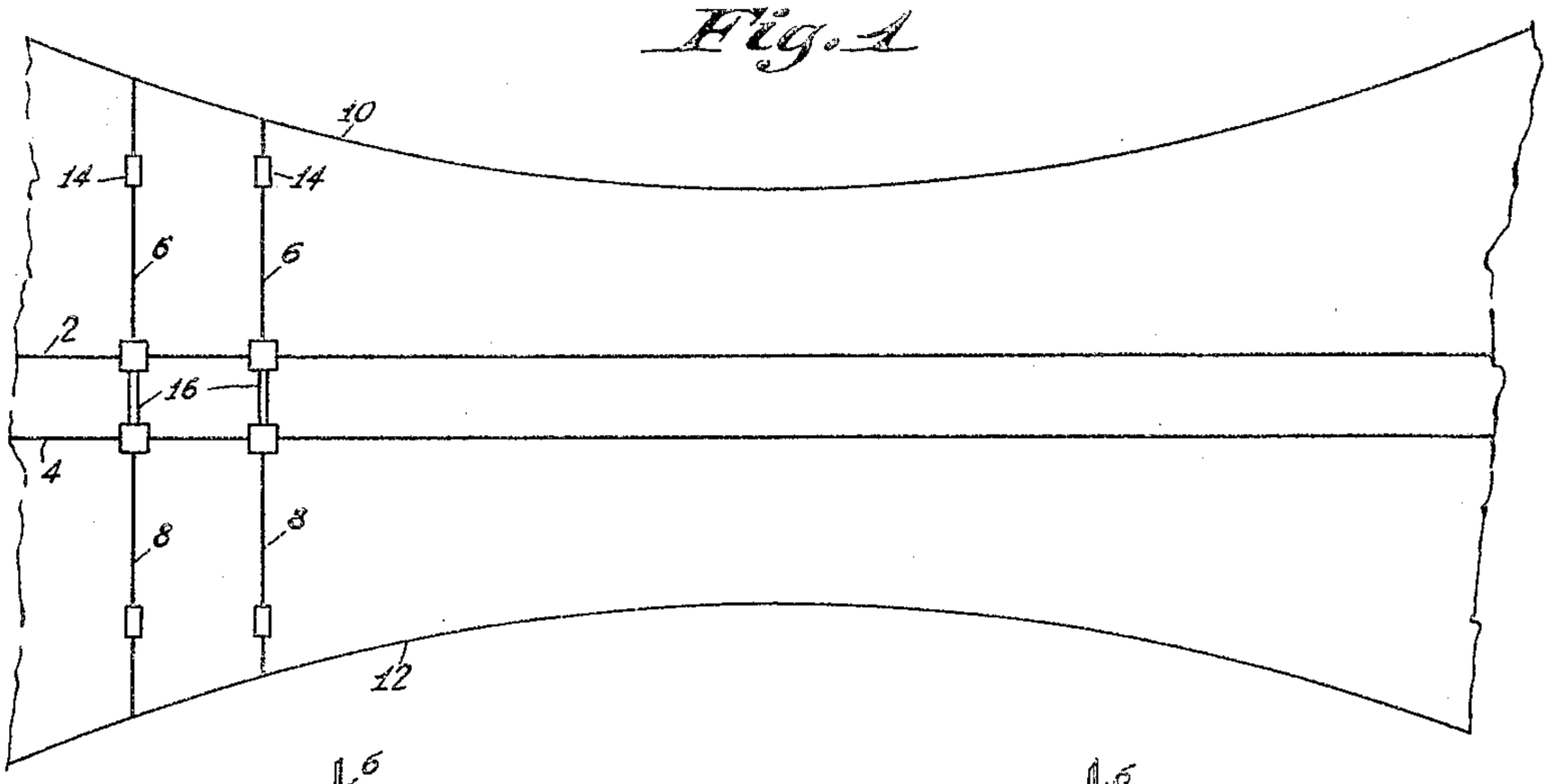


Fig. 3

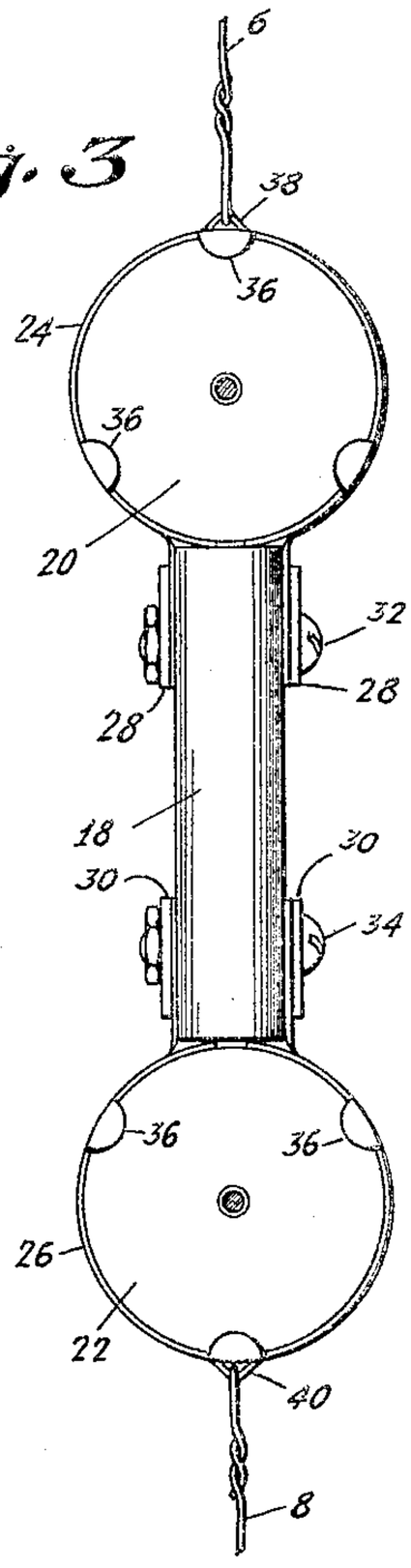
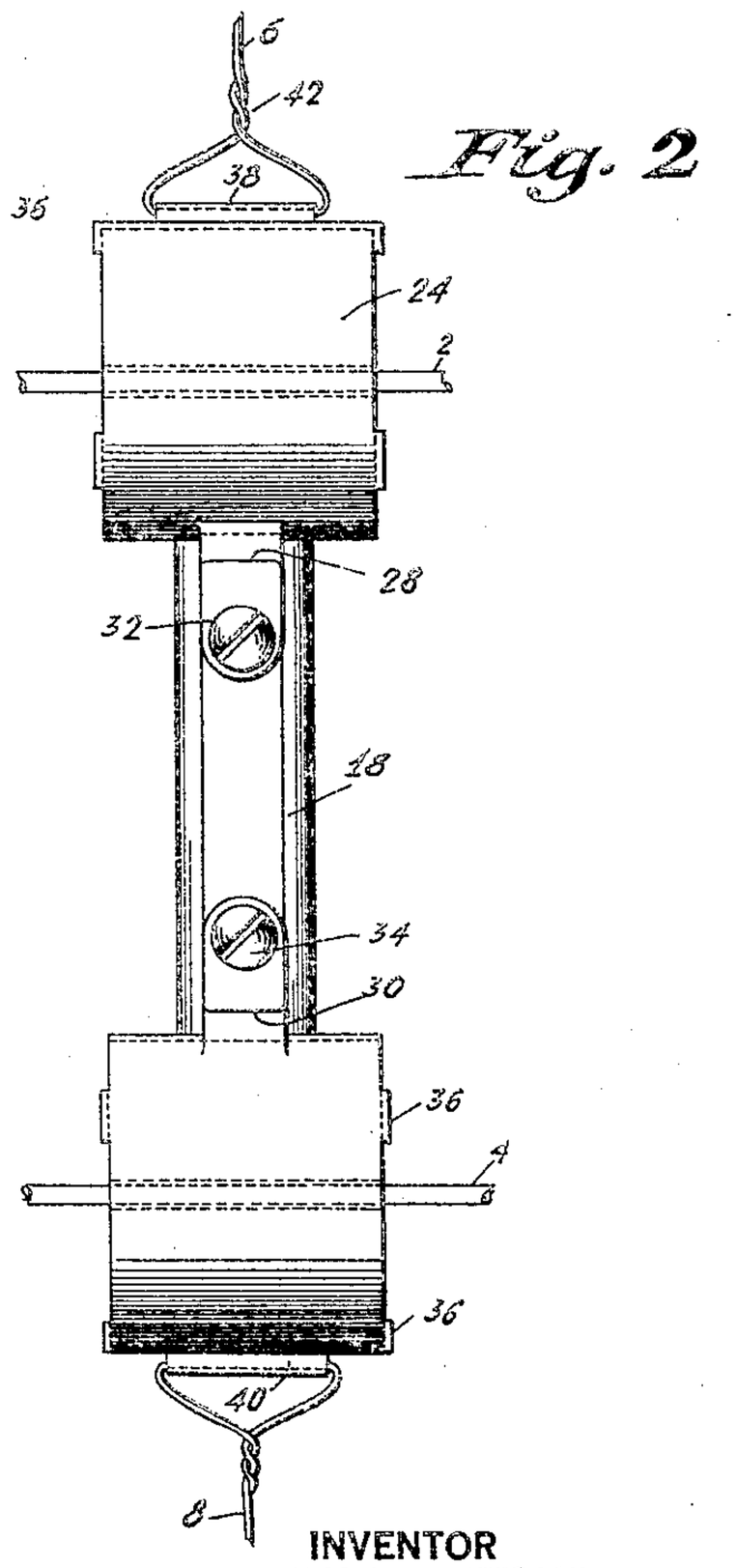


Fig. 2



INVENTOR
HAROLD O. PETERSON

BY W. L. Grover

ATTORNEY

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HAROLD O. PETERSON, OF RIVERHEAD, NEW YORK, ASSIGNOR TO RADIO CORPORATION OF AMERICA, A CORPORATION OF DELAWARE

ANTENNA INSULATION

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A recently developed, and extremely simple and efficient type of antenna, is one which comprises a pair of linear feeder members having transversely coupled thereto linear radiators or oscillators. To give the antenna and end-on characteristic, energy is made to travel along the feeder members at a speed equivalent to that of an electromagnetic wave in space; and, for a directional characteristic in broadside or perpendicular to the plane of the tranversals, energy transfer along the feeder members is given an infinite velocity.

In order to cause the desired velocities of energy along the feeder members, it is necessary that the feeder members be kept linear or straight; and, that the radiators be coupled, preferably capacitively, to the feeders. To provide a combined insulator and coupling device, which will allow the feeders to be kept parallel and perfectly linear, and allow of capacitive coupling of the radiators to the feeders is the prime object of the present invention. This object I fulfill by providing an element to which are attached feeder guiding members, and on the outer periphery of the latter I provide metallic parts or surfaces to which the radiators may be coupled so that desired capacitive coupling with the feeders, guided by the members, may be had.

I am defining with particularity the novel features of my invention in the appended claims. However, it may best be understood as to its structural organization and method of operation by referring to the accompanying drawing, in which

Figure 1 schematically shows a section of an antenna for which the present invention is especially adapted,

Figure 2 is a detailed elevational view of my combined insulator and coupling device showing the feeder members and radiators in place, and,

Figure 3 is an elevational view of the combined insulator and coupling device taken at right angles with reference to Figure 2.

Turning to Figure 1, feeder members 2, 4 have externally and transversally connected thereto linear radiators or oscillators 6, 8. To support the antenna structure, catenary supporting elements 10, 12 are provided which are supported by masts or towers (not shown) and which maintain the antenna structure vertically, horizontally, or at any desired angular position. The radiators 6, 8 are tied to the catenary supporting elements by suitable low loss insulators 14 which effectively leave the external ends of the radiators electrically open ended.

In order to eliminate any tendency to upset the smooth transfer of energy along the feeder members 2, 4, the radiators 6, 8 should be coupled thereto through impedances, preferably capacities of suitable value. For further explanation of this action and for a complete description of the antennæ referred to reference is made to Patent No. 1,821,402, issued Sept. 1, 1931 to Harold O. Peterson, also Patent Nos. 1,821,386 and 1,821,387, issued Sept. 1, 1931 to Nils E. Lindenblad. In order to suitably couple the radiators to the feeder members I provide the combined insulators and coupling devices 16 which together with the supporting means for the antenna also maintain feeder members 2, 4 in desired parallel and linear relationship.

The structure of the combined insulator and coupling element may best be understood by referring to Figures 2 and 3. As in Figure 1 the feeders and radiators are indicated at 2, 4, 6 and 8 respectively. To maintain the feeders in desired spacial relationship, a non-conducting, cylindrical, tension element 18 of suitable length is provided, to the extremities of which are fastened cylindrical feeder guiding members 20, 22 also of non-conducting material. The feeder guiding members are arranged so that their axes are substantially at right angles to the axis of tension element 18. Tension element 18 and also the feeder guiding members should be made of a material such as isolantite for example, having high tensile strength and low dielectric loss.

About each feeder guiding element are metallic parts 24, 26 punched so as to have tongues 28, 30. By means of bolts 32, 34 engaging tongues 28, 30 and tension element 18, feeder guiding members 20, 22 are fixed to the ends of tension element 18. In order to

prevent axial movement of the guiding members and to retain them within the metallic surfaces or peripheries 24, 26, additional tongues 36 are also punched integral with metallic parts 24, 26.

Of course, radiators 6, 8 could be directly soldered to metallic parts 24, 26. However, due to its inherent weakness, this is not a desirable construction. In order to strengthen the connection of the radiators to the metallic parts 24, 26, I further punched therein lips 38, 40 through which the radiators are run parallel to the feeders and thence swung back upon themselves as at 42.

By suitable design and choice of materials as well as choice of width of the metallic peripheries 24, 26 capacitive coupling between the feeder members and the radiators may be made any suitable value.

Having thus described my invention what I claim is:

1. In combination, for high frequency apparatus a non-conducting tension element, metallic electrostatic coupling enclosures fixed at each end thereto, feeder insulating guiding members within the enclosures, and means on the enclosures for fastening conductors thereto.

2. In combination, for high frequency apparatus a non-conducting element, metallic electrostatic coupling enclosures fixed thereto, feeder insulating guiding members within the enclosures, means for retaining the guiding members therein, and means on the metallic enclosures for fastening conductors thereto.

3. In combination, for high frequency apparatus, a straight insulating element, metallic parts fixed to the extermities thereof cylindrical insulating feeder guiding members within each part arranged with their axes traversing the axis of the insulating element, said metallic parts adapted to have conductors attached thereto.

4. The combination of a cylindrical tension element of insulating material, cylindrical feeder members arranged with the axes traversing the tension element, metallic parts for fastening the members to the cylindrical element, and means on the parts for having conductors fixed thereto.

5. An insulating tension element, metallic enclosures fixed thereto, a feeder supporting member of insulating material within each metallic enclosure, tongues on each enclosure to retain the feeder supporting members therein, and a raised lip on each enclosure adapted to have a conductor fastened thereto.

6. A high frequency insulator and capacitive coupling device comprising an insulating spacing member for spacing a plurality of feeders, metallic condenser armatures fixed to the ends of said spacing member, means on each of said armatures for connecting said armatures with radiating elements, and a solid dielectric interposed between said armatures and said feeders.

7. A high frequency antenna insulator and capacitive coupling device comprising an insulating spacing member adapted to retain a pair of feeders, a condenser plate fixed to each end of said spacing member, a solid insulator interposed between said condenser plate and said feeders, and connection means attached to each of said condenser plates for connecting said plates with radiating elements.

8. A high frequency antenna insulator and capacitive coupling device comprising an insulating member cooperating with a pair of solid dielectrics having apertures for spacing a pair of feeders, metallic bands on the ends of said insulating member substantially surrounding said dielectrics and adapted to space and retain said dielectrics from each other.

9. An antenna capacitive coupling insulator comprising an insulating spacing member, a condenser retained at each end of said spacing member, said condenser comprising a pair of electrodes, one of said electrodes being an outer metallic band with connection means, a solid dielectric retained within said band having a central aperture, a feeder passing through said aperture to form the other condenser electrode.

10. An antenna capacitive coupling device comprising an insulating central spacing member, coupling elements at each end of said central spacing member having connection means for antenna radiators, an insulator within each of said coupling elements, said insulator having an aperture to retain a pair of feeders for coupling the antenna radiators with said feeders.

11. An antenna insulator and capacitive coupling device comprising an insulating central member for spacing a plurality of feeders, a plurality of antenna radiators, condenser elements at each end of said central member, a solid dielectric having a central aperture contained within said condenser element, raised terminal ears on said condenser elements for connecting and coupling said antenna radiators with said feeders passing through the apertures of said dielectric, the feeders forming the other condenser element.

HAROLD O. PETERSON.