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GUY WIRE LOADED FOLDED ANTENNA

Filed Aug. 30, 1960

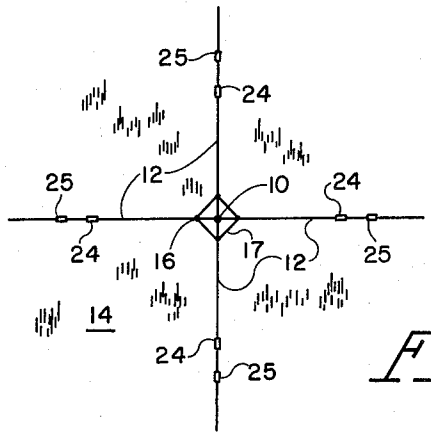

Fig. 2

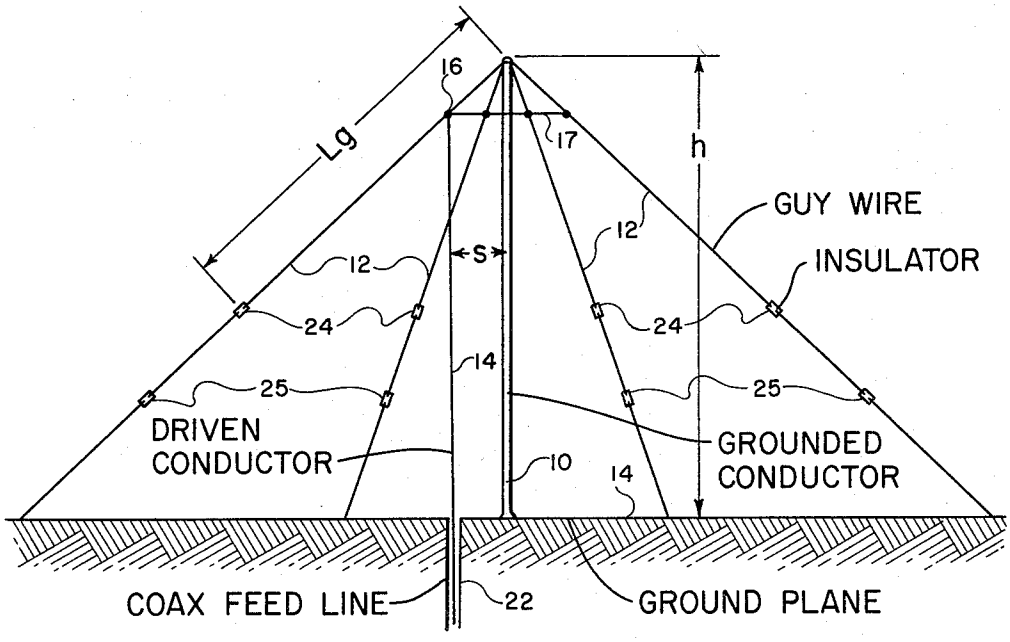

Fig. 1

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GUY WIRE LOADED FOLDED ANTENNA

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6 Claims. (Cl. 343—846)
(Granted under Title 35, U.S. Code (1952), sec. 266)

The invention herein described may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

The present invention relates to antennas and more particularly to a very short antenna for radiating electromagnetic energy efficiently at low frequencies.

Previously, guy wire loading has been used to reduce the resonant length of broadcast antennas but had the disadvantage of producing a reduction in radiation resistance and substantially decreasing the bandwidth. Further, the ground current losses are great with low radiation resistance unless an expensive metal ground screen is laid under the antenna, and there are dielectric losses in the dielectric material used to insulate the antenna from ground.

The guy wire loaded folded antenna of the present invention is a vertical grounded conductor with several guy wires connected at the top and extending radially out to the ground to form a cone about the grounded conductor. The guy wires are broken with insulators at some distance out from the top toward the ground depending on how much loading is desired. The present invention is an improvement over previous antennas in that it utilizes a very short antenna, increases the resonant radiation resistance of the antenna, maintains the bandwidth as much or greater than a quarter-wave monopole and permits choosing the resonant radiation resistance over a 10 to 1 range without increasing the antenna length.

It is an object of the invention, therefore, to provide a new and improved antenna that is very short and permits efficient radiation of electromagnetic energy at low frequencies.

It is another object of the invention to provide a guy wire loaded folded antenna with grounded mast, short resonant length, and bandwidth greater than a monopole of equal length and diameter.

It is a further object of the invention to provide a novel short antenna that permits choosing the resonant radiation resistance over a 10 to 1 range without increasing the antenna length.

Other objects and many of the attendant advantages of this invention will become readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings wherein:

FIGURE 1 of the drawing is a diagrammatic illustration of a guy wire loaded folded antenna of the present invention.

FIGURE 2 is a plane view of the antenna of FIGURE 1.

The antenna of the present invention, as illustrated in the drawings, comprises a vertical grounded conductor or mast **10** having several guy wires **12** connected thereto at the top thereof. The guy wires **12** extend radially outward from the top of grounded conductor **10** and downward to a ground plane **14**; the several guy wires **12** all lie within a conical surface about grounded conductor **10**. A driven conductor **14** is positioned parallel to grounded conductor **10** and is connected at point **16** to a guy wire **12**. Guy wires **12** are connected together and to point **16** by conductors **17**, at a short distance from

grounded conductor **10** and from the top of the grounded conductor. Conductor **14** is fed at the ground plane **20** via coaxial feed line **22**. Guy wires **12** are broken with insulators **24** and **25** some distance out from the top of grounded conductor **10** toward the ground plane **20** depending on the amount of loading desired.

The resonant height of the guy wire loaded folded antenna may be adjusted by varying the length, L_g, the conducting length of guy wires **12** and also by changing the axial spacing, S, the distance between parallel driven conductor **14** and grounded conductor **10**. The resonant height can be made 0.1 wavelength for a resonant radiation resistance of 50 ohms and a half power bandwidth of 32%, for example. The radiation resistance may be varied by changing the ratio of the diameter of grounded conductor **10** to the diameter of driven conductor **14**.

The advantage of a wide choice of resonant radiation resistance eliminates the need for a matching network between the antenna and the transmission line feeding it. The high radiation resistance reduces the ground losses. At low frequency operation the most important advantage is the reduction in height of the antenna over a quarter wave antenna, a factor of at least five and a half to one. Furthermore, the antenna is a grounded structure and therefore the transmitter feeding it would be protected from lightning.

Obviously many modifications and variations of the present invention are possible in the light of the above teachings. It is therefore to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described.

What is claimed is:

1. An antenna having high radiation resistance and short resonant length comprising a conducting mast mounted perpendicular and grounded to a ground plane, a plurality of guy wires connected to the top of said mast and extending outwardly and downwardly to said ground plane, said guy wires being broken and insulated from said ground plane by insulators positioned a substantial distance from the top of said mast, a driven conductor positioned parallel to said mast and connected to said guy wires at a short distance from said mast, the resonant height of said antenna being adjustable by varying the conducting length of said guy wires between the top of said mast and said insulators.

2. An antenna as in claim 1 wherein the resonant height of said antenna also may be adjusted by changing the distance between the parallel driven conductor and the grounded conducting mast.

3. An antenna as in claim 1 wherein the radiation resistance of said antenna may be varied by changing the ratio of the grounded conducting mast diameter to the driven conductor diameter.

4. An antenna as in claim 1 wherein said driven conductor is fed through a coaxial feed line at said ground plane.

5. A guy wire loaded folded antenna having high radiation resistance and short resonant length comprising a conducting mast mounted perpendicular and grounded to a ground plane, a plurality of guy wires connected to the top of said conducting mast and extending radially outwardly and downwardly to said ground plane, said plurality of guy wires lying within a conical surface about said grounded conducting mast, said guy wires being broken and insulated from said ground plane at a substantial distance from the top of said conducting mast, a driven conductor positioned parallel to said mast and connected to said guy wires at a short distance from said mast and the top thereof, the resonant height of said antenna being adjustable by varying the conducting length of said guy wires between said insulators and the

top of said mast and also by changing the distance between said parallel driven conductor and said mast, wherein the bandwidth of said antenna is greater than a monopole of equal length and diameter.

6. An antenna as in claim 5 wherein the radiation resistance thereof may be varied by changing the ratio of the diameter of said grounded conducting mast to the diameter of said driven conductor.

No references cited.