

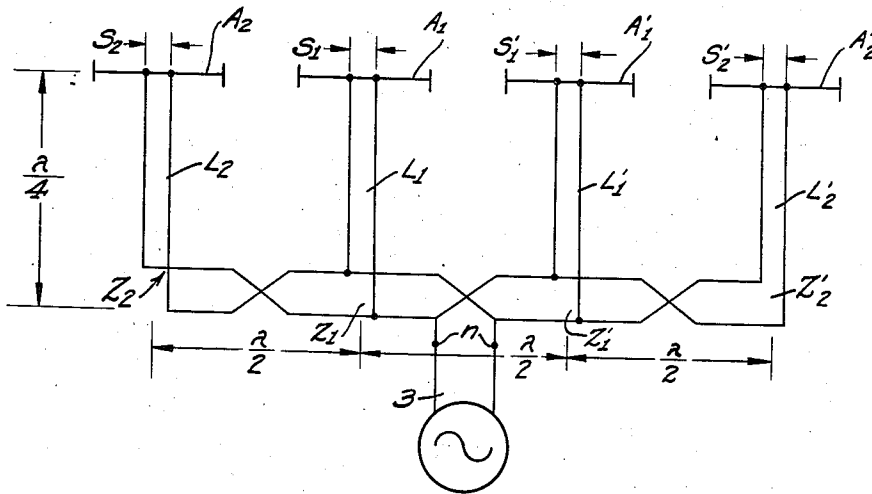
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HIGH FREQUENCY ENERGY DISTRIBUTION SYSTEM

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HIGH FREQUENCY ENERGY DISTRIBUTION SYSTEM

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This invention relates to a system for distributing high frequency energy from a single source to a plurality of loads so as to deliver different amounts of energy to the different loads.

In known forms of arrays it is often desirable to supply different antennae with different amounts of energy. One type of such array is known arrangements wherein the energy is distributed among the units of an array in accordance with a binominal expansion.

It is a principal object of my invention to provide an arrangement for feeding energy from a single high frequency source to a plurality of parallel connected loads, in desired energy transfer relations.

To accomplish this result I provide a transmission line coupled to a source of high frequency energy, at points along the line, spaced substantially a half wavelength at the operating frequency are provided branching transmission lines. Phase coincidence or opposition of the energy supplied to each branch may be controlled by the provision of transpositions. Each of said branch lines is made electrically equal to substantially an odd quarter wavelength long and the end away from said transmission line is connected to a load circuit such as an antenna conductor or the like. By adjusting the spacing between said branch conductors at their point of connection to said loads proportion of the energy fed to each load may be controlled.

A better understanding of my invention, as well as other objects and features thereof, may be had from the particular description of an embodiment thereof made in connection with the accompanying drawing, the single figure of which illustrates an antenna array energized by a system in accordance with my invention.

The antennae A_1 , A_1' , A_2 , A_2' represent the elements of an antenna array wherein a greater amount of energy is fed to the units A_1 than to the units A_2 . It is clear that further elements may be added if desired, four only being shown to simplify the description. Units A_1 , A_1' , A_2' , are shown as loaded so that their physical length is less than their electrical length.

Antennae A_1 , A_1' , A_2 , A_2' , are connected by means of lines L_1 , L_1' , L_2 , L_2' , respectively, to a common transmission line 2. Lines L_1 , L_1' , L_2 , L_2' , are made approximately equal to a quarter wavelength long so that impedances Z_1 , Z_2 , etc., of the corresponding circuit presented to the common transmission line are nearly pure re-

sistances when the corresponding dipoles are tuned to the operating frequency.

Branch lines L_1 , L_2 , etc., are connected to transmission line 2 at points electrically a half wavelength apart so that their respective impedances Z_1 , Z_2 , etc., are effectively in parallel. The smaller the spacings S_1 , S_2 , S_1' , S_2' , of lines L_1 , L_2 , L_1' , L_2' , at their connection point with antennae A_1 , A_2 , A_1' , A_2' , the higher is the corresponding impedance Z_1 , Z_2 , Z_1' , Z_2' , since then the quarter wave lines approach substantial short circuits. It is, therefore, clear that by adjusting the spacing s the impedance is controlled and consequently the division of power among the antennae.

By properly selecting S_1 , S_2 , etc., it is possible not only to distribute the power to the load elements in any desired ratio but also to obtain approximately surge impedance at the point of n , n , where the main feeder 3 is connected to line 2.

This arrangement is well adapted for use in marker beacon systems wherein the antenna units are arranged above a screening member, since the spacing in such cases is generally a quarter wavelength above the screen and the feeding connections may be made just above or below the screen.

The arrangement is convenient mechanically since the spacing S_1 , S_2 , etc., is small. Moreover, adjustment of power distribution may be made without opening any junction fittings. The current distribution may be approximately checked merely by observing the spacings S_1 , S_2 , etc.

While I have shown by way of illustration a particular type of array, it should be understood that my invention is not limited to such a special embodiment. The principles of my invention may be used for securing a desired distribution of high frequency energy in any desired system. What I consider as my invention and desire to protect is embodied in the accompanying claims.

What is claimed is:

1. Means for distributing energy in a desired ratio among a plurality of loads comprising a source of high frequency energy, a high frequency transmission line connected to said source, a plurality of branch transmission lines coupled to said high frequency transmission line at points spaced apart a distance equal to substantially an odd integral multiple of a half wavelength at the operating frequency, said branch conductors being substantially an odd integral multiple of a quarter of said wavelength

long, and a plurality of high frequency loads comprising radiant acting conductors connected to said respective branch transmission lines, the spacing between the conductors of said branch lines at the point of connection to said loads 5 loads being adjusted to secure the desired energy division among said loads.

2. An antenna array comprising a plurality of radiating conductors, a common transmission line, a plurality of two wire transmission lines 10 connected between respective ones of said radiating conductors and said common transmission line at points spaced apart substantially an odd integral multiple of a half wavelength at the operating frequency, said two wire transmis- 15

sion lines being each substantially an odd integral multiple of a quarter wavelength long, the spacing between the conductors of said transmission lines at points of connection to said radiating conductors being adjusted to control the distribution of energy among said radiating conductors.

3. An antenna array according to claim 2 further comprising a main feeder line for supplying energy to said radiating conductors over said common transmission line, wherein said spacing is adjusted to present substantially surge impedance to said feeder line.

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