

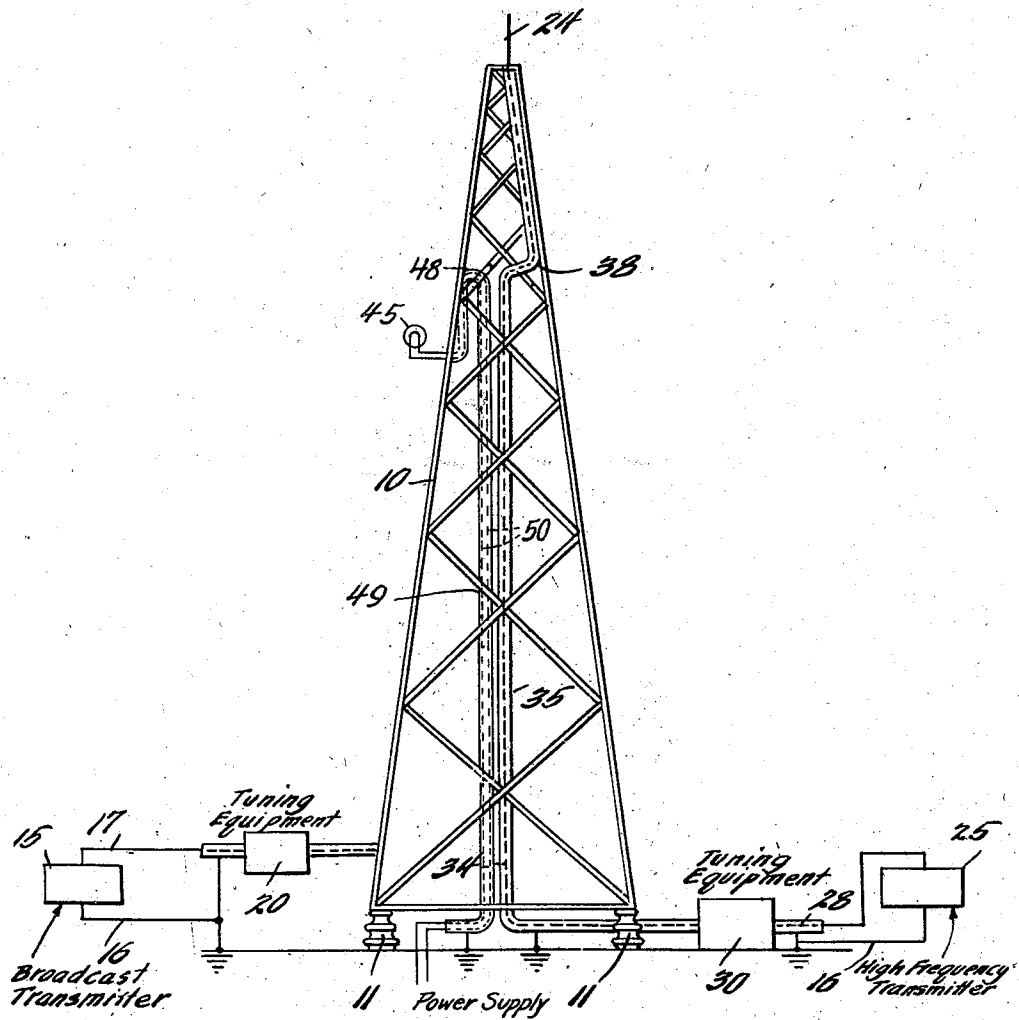
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ELECTRIC DISTRIBUTION SYSTEM

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ELECTRIC DISTRIBUTION SYSTEM

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This invention relates to improvements in electrical distribution systems, and more especially to the transmission of energy between the base of a radio tower and an elevated point or points on the tower.

The invention is particularly useful in its application to radio towers of the type in which the tower is mounted on insulated supports and serves as the antenna, for example for the transmission of signals of broadcast frequency; it is an object of the invention to associate with such a tower an additional distribution system, for instance, a high frequency transmitting or receiving system. Thus it may be desirable to mount a high frequency antenna on an existing tower antenna designed for the transmission of frequencies within the broadcast band, but previously suggested methods of feeding the high frequency antenna have involved the use of complicated and expensive equipment in order that interference with the broadcast signals be reduced to a minimum. By means of the present invention I am enabled to associate high frequency and other equipment with broadcast towers without interfering with the broadcast signal and with a minimum of expense and difficulty in installation.

More specifically, the invention contemplates the transmission of energy to an elevated point on a tower antenna by means of a coaxial transmission line or cable, the outer conductor of the coaxial cable being grounded adjacent the base of the tower, being insulated from the tower to a point of which the height above the tower base is approximately one-fourth of the wave-length of the frequency applied to the tower, and being bonded or electrically connected to the tower at this point and at all points beyond. It will be appreciated that this arrangement is such that the tower base and the adjacent portion of the coaxial cable are substantially 180° out of phase at the frequency of the energy applied to the tower.

The invention also finds application in the mounting of signal lights and other electrical devices on the tower; in the event such devices are located at a height less than one-fourth of the wave-length of the energy applied to the tower, the coaxial transmitting cable is insulated from the tower up to the prescribed point and is thence returned downward to the device, being bonded to the tower between the device and such point.

Further objects and features of the invention will be apparent from the following description

taken in connection with the accompanying drawing, the single figure of which shows an electrical distribution system illustrating the application of my invention to a radio tower for the transmission of broadcast frequencies on which is supported a separate antenna for the transmission or reception of signals of a different frequency.

In order to facilitate the description of the invention and to promote an understanding of its principles, the invention is illustrated by a specific and preferred embodiment thereof. It will nevertheless be appreciated that various alterations and further modifications of the illustrated structure are contemplated such as fall within the purview of the invention and especially within the scope of the claims appended hereto.

The tower shown at 10 is of conventional design, the base being mounted on insulators 11 so that the tower is insulated from the ground. Transmitting equipment is represented diagrammatically, and includes a transmitter 15 of which one of the output conductors 16 is grounded, the other output conductor 17 being connected through the inner conductor 18 of a coaxial cable to suitable tuning equipment 20 and thence to the tower. The details thus far described may be widely varied and form per se no part of the present invention.

Adjacent the upper end of the tower 10 is mounted a high frequency antenna 24 of any suitable type. This antenna is supplied with energy from suitable equipment which may include a high frequency transmitter 25, one output conductor of which is fed through a coaxial cable 28 to tuning equipment 30, the other conductor 16 being grounded.

From the tuning equipment 30 the signal is transmitted by the inner conductor 34 of a concentric transmission line 35. The outer conductor of transmission line 35 is grounded adjacent the base of the tower and is insulated from the lower part of the tower, being carried up to a point 38 of which the height above the tower base is approximately one-fourth of the wave-length of the energy which is applied to the tower from the transmitter 15. From point 38 the concentric transmission line is continued upwardly to a point adjacent the antenna, being bonded along this entire portion of its length to the tower. The inner conductor 34 is electrically connected to the antenna 24.

With this arrangement, the radiation resistance of the broadcast transmission tower is not affected

ed nor is the efficiency of the tower in any way impaired; neither transmitted frequency interferes with the other. The same construction may, of course, be employed in the event the antenna 24, or the tower 10, is used for the reception rather than radiation of signal energy, and other electrical devices, such as aircraft warning lights and the like, may be similarly supplied with current. In the event such a device, for instance a light 45, is disposed below the prescribed point 48 representing a height of one-fourth of the wave-length of the energy applied to the tower, the line, comprising shielded conductor 49 having internal conductors 50 connected to a suitable source of voltage supply, is returned downward to the device, the shield being bonded to the tower along such downward extension.

The present invention has proven exceedingly satisfactory in the installation of antennae for frequency modulation and television transmission and reception, existing broadcast transmission towers being employed to support the additional antennae.

Having thus described the invention what is claimed as new and desired to be secured by Letters Patent is:

1. In an electrical distribution system, the combination with a radiating antenna tower for signals of a frequency within the broadcast band, of a high frequency antenna mounted on said tower at an elevated point, and means for transmitting high frequency signals to said high frequency antenna from generating equipment therefor, said means comprising a coaxial transmission line extending upward on and insulated from said tower to a point approximately one-fourth of the wave-length of the broadcast signal energy applied to the tower, said high frequency antenna being spaced from said last named point, the outer conductor of said transmission line being grounded adjacent the tower base and electrically connected to said tower at said last named point and over the distance between said last named point and said high frequency antenna, and the inner conductor of said transmission line being electrically connected to said high frequency antenna to energize the latter.

2. In an electrical distribution system, the combination with a radiating antenna tower for transmitting signal energy, of a device mounted on said tower at an elevated point, and means for transmitting electrical energy between said device and a point adjacent the tower base, said means comprising a coaxial transmission line extending upward on and insulated from said tower to a point approximately one-fourth of the wave-length of the signal energy applied to the tower, said device being spaced from said last named point, the outer conductor of said transmission line being grounded adjacent the tower base and electrically connected to said tower at said last named point and over the distance between said last named point and said device, and the inner conductor of said transmission line being electrically connected to said device for the transmission of energy.

3. In an electrical distribution system, the combination with a radiating antenna tower for signals of a frequency within the broadcast band, of a second antenna mounted on said tower at an elevated point and insulated therefrom, and means for transmitting signal energy between said second antenna and a point adjacent the tower base, said means comprising a coaxial

transmission line extending upward on and insulated from said tower to a point approximately one-fourth of the wave-length of the broadcast signal energy applied to the tower, the outer conductor of said transmission line being grounded adjacent the tower base and electrically connected to said tower at said last named point, and the inner conductor of said transmission line being electrically connected to said second antenna for transmitting energy.

4. In an electrical distribution system, the combination with a radiating antenna tower having a height not less than one-fourth the wave-length of the signal energy applied to the tower, of a device mounted on said tower at an elevated point, means for transmitting electrical energy between said device and a point adjacent the tower base, said means comprising a coaxial transmission line extending upward on and insulated from said tower to a point spaced from the tower base by a distance approximately equal to one-fourth of the said wave-length, the outer conductor of said transmission line being grounded adjacent the tower base and electrically connected to said tower at said last named point, and the inner conductor of said transmission line being electrically connected to said device for the transmission of energy, whereby the tower base and the adjacent portion of the said outer conductor are approximately 180° out of phase at the frequency of the signal energy applied to the tower.

5. In an electrical distribution system, the combination with a radiating antenna tower for signals of a frequency within the broadcast band, of a high frequency antenna mounted on said tower at an elevated point, the distance from said point to the tower base being greater than one-fourth of the wave-length of the broadcast signal energy applied to the tower, and means for transmitting high frequency signals to said high frequency antenna from generating equipment therefor, said means comprising a coaxial transmission line extending upward on and insulated from said tower to a point approximately one-fourth of the wave-length of the broadcast signal energy applied to the tower, said high frequency antenna being spaced from said last named point, the outer conductor of said transmission line being grounded adjacent the tower base and electrically connected to said tower at said last named point, and the inner conductor of said transmission line being electrically connected to said high frequency antenna to energize the latter.

6. In an electrical distribution system, the combination with a radiating antenna tower for signals of a frequency within the broadcast band, of a high frequency antenna mounted on said tower at an elevated point, and means for transmitting high frequency signals to said high frequency antenna from generating equipment therefor, said means comprising a coaxial transmission line extending upward on and insulated from said tower to a point approximately one-fourth of the wave-length of the broadcast signal energy applied to the tower, the outer conductor of said transmission line being grounded adjacent the tower base and electrically connected to said tower at said last named point, and the inner conductor of said transmission line being electrically connected to said high frequency antenna to energize the latter.

7. In an electrical distribution system, the combination with a radiating antenna tower for sig-

nals of a frequency within the broadcast band, of a high frequency antenna mounted on said tower at an elevated point, and means for transmitting high frequency signals to said high frequency antenna from generating equipment therefor, said means comprising a shielded conductor transmission line extending upward on and insulated from said tower to a point approximately one-fourth of the wave-length of the broadcast signal energy applied to the tower, the shield of said transmission line being grounded adjacent the tower base and electrically connected to said tower at said last named point, and a conductor of said transmission line being electrically connected to said high frequency antenna to energize the latter.

8. In combination, a conductive antenna struc-

ture, insulated from the ground, used at a predetermined radio frequency, a conductive shielding conduit carrying an auxiliary service to the antenna structure, a low impedance bond between the upper end of said conduit and an adjacent point on the said conductive antenna structure, and a low impedance connection to earth at the lower end of said conduit, the distance between said low impedance bond and said low impedance connection to earth, measured along said conduit, being approximately any odd number of quarter wave-lengths for the said predetermined antenna frequency, said conduit being positioned with respect to said antenna structure so as to form an open wire transmission line therewith.

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