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ANTENNA TUNABLE IN ITS LENGTH

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Fig. 1.

Fig. 1a.

Fig. 2.

Mercury

TO TRANSMITTERS

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The invention relates to antennas and antenna systems with tunable length whereby the variations of the length shall be remotely controlled. It is known to tune in their length individual antennas and dipole systems by mechanical means but this requires in general cumbersome devices which, in the majority of cases, have also a detrimental effect upon the diagram of the antenna. Contrary thereto, the invention relates to an arrangement for antennas, the length of which can be varied for tuning purposes in which this disadvantage is avoided and which offers the possibility at the same time to read the momentary antenna length at the place of control.

In accordance with the invention an antenna which can be tuned in its length is characterized by the use of a dielectric tube in the interior of which a mercury column can be moved by applying pressure.

In its simplest mode of construction a single linear antenna according to the invention has the form of a manometer column which by applying air pressure or liquid pressure can be varied in its length from any desired place of control. Figure 1 shows such a tunable antenna while Figure 1a shows a modification of a portion of Figure 1 and Figure 2 shows a dipole antenna utilizing the principle of the invention. In Figure 1 item 1 is a dielectric tube which may consist of Pertinax, glass or any other suitable material and which immerges in a storage vessel 2 filled with mercury. Through the tube 1 any desired gas pressure or liquid pressure can be maintained in the interior of the vessel 2 so that the mercury column has a corresponding height h. At a pressure of 1 atmosphere this height is 76 cm. for instance. The dielectric tube 1 is closed up preferably by means of a felt plug or any other suitable arrangement admitting air so as to prevent dirt from entering the mercury.

The antenna in accordance with the invention can be employed to advantage for a great many different purposes. Thus, as already mentioned, for instance, the control of tunable antennas can be carried out in the simplest manner in accordance with the invention. Furthermore, when providing at the upper end of the tube 1 a tight closure as shown in Figure 1 at X, in place of the felt plug thereby having a barometric vacuum, it is possible to utilize the antenna for meteorological distant reports of the air pressure, for instance, for measuring the height of an ascending test balloon. The portion of Figure 1a above lines X, X is to be considered substituted for that same portion of Figure 1. Also, the temperature can be transmitted in a wireless fashion by using a mercury thermometer as antenna in that the resonance frequency of the antenna is a measure for the temperature. For such meteorological distant reports a particular advantage is offered when utilizing the antenna as a frequency determining circuit of an oscillator so that the produced and radiated frequency is directly a measure for the value being reported.

Another favorable possibility of applying the invention lies in the field of the horizontal dipole antennas and directional radiators which are assembled from several dipole antennas, for instance, in the form of a pine tree antenna.

Figure 2 shows schematically such a dipole. Its two arms consist of the tubes 1 made of insulating material (for instance glass, rubber, Pertinax or the like) and having a corresponding length, said tubes are slightly inclined and partly filled with mercury. The lower portion of each is immersed in an individual storage vessel 2 for the mercury 8 which also forms a conduction means for the current. From the two storage vessels the mercury is forced into the two antenna tubes 1 either by air pressure or by the pressure of a non-conducting liquid such as paraffin oil for instance, and by means of the pressure line 3 which is made of insulating material at least as far as its upper part is concerned which joins the dipole. The mercury is pushed upwards in the tubes in accordance with the pressure and in both arms to the same height since in both halves the same pressure prevails.

The pressure is produced inside the station in the vicinity of the receiver and transmitter by means of a pressure pump 4 or the like, released again, if desired, by means of a valve 5 and read at a manometer 6. This manometer can be gauged at the same time in accordance with the respectively effective length of the antenna.

In order to prevent an occasional overflow of the mercury column at the ends of the antenna tubes and to prevent losses the open ends of said tubes are provided with felt plugs 7 which admit air but no mercury. If desired, similar felt plugs may also be provided at the storage vessels.

The dipole is mounted on a board suitably coated with paraffin or in a box thus impregnated and the whole protected by a roof or other cover so that the influence of the atmospheric moisture upon this box is prevented. This antenna is
suited for receiving purposes as well as for transmission purposes.

Such dipole antennas as already pointed out can be combined into directional radiators formed of several individual dipoles and the particular advantage is thereby obtained that at the control of all dipole lengths by means of a common pressure chamber the dipoles have throughout the same length immediately which corresponds to the pressure.

The invention is not limited to the examples of construction herein shown but may also be utilized in many other antenna shapes.

I claim:

1. A radio transmitter including a variable length radiating member and means for supplying high frequency energy thereto, said member being adapted to control the frequency of said energy in accordance with its length and means for varying said length in accordance with predetermined meteorological conditions.

2. A radio transmitter including a variable length radiating member and means for supplying high frequency energy thereto, said member being adapted to control the frequency of said energy in accordance with its length and means for varying said length in accordance with the barometric pressure of the atmosphere.

3. A radio transmitter including a variable length radiating member and means for supplying high frequency energy thereto, said member being adapted to control the frequency of said energy in accordance with its length and means for varying said length in accordance with the temperature of said radiating member.

4. A radio transmitter including a variable length radiating member and means for supplying high frequency energy thereto, said member being adapted to control the frequency of said energy in accordance with its length, said radiating member comprising a column of conductive fluid within an insulating tube closed at at least one end.

5. A radio transmitter including a variable length radiating member and means for supplying high frequency energy thereto, said member being adapted to control the frequency of said energy in accordance with its length, said radiating member comprising a mercury barometer whereby the high frequency energy radiated is varied in frequency as the atmospheric pressure varies.

6. A radio transmitter including a variable length radiating member and means for supplying high frequency energy thereto, said member being adapted to control the frequency of said energy in accordance with its length, said radiating member comprising a mercury thermometer whereby the energy radiated is varied in frequency as the temperature varies.

7. A radio transmitter including an antenna comprising a pair of variable length radiating members, said members being arranged in a substantially horizontal end to end relationship, means for supplying high frequency energy to said radiating members, said radiating members being adapted to control the frequency of said energy in accordance with their length and means for varying said length in accordance with predetermined meteorological conditions.

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