Aug. 9, 1938. W. S. DUTTERA 2,126,543

INSULATING ARRANGEMENT FOR ANTENNA

Filed April 15, 1937

Fig. 1

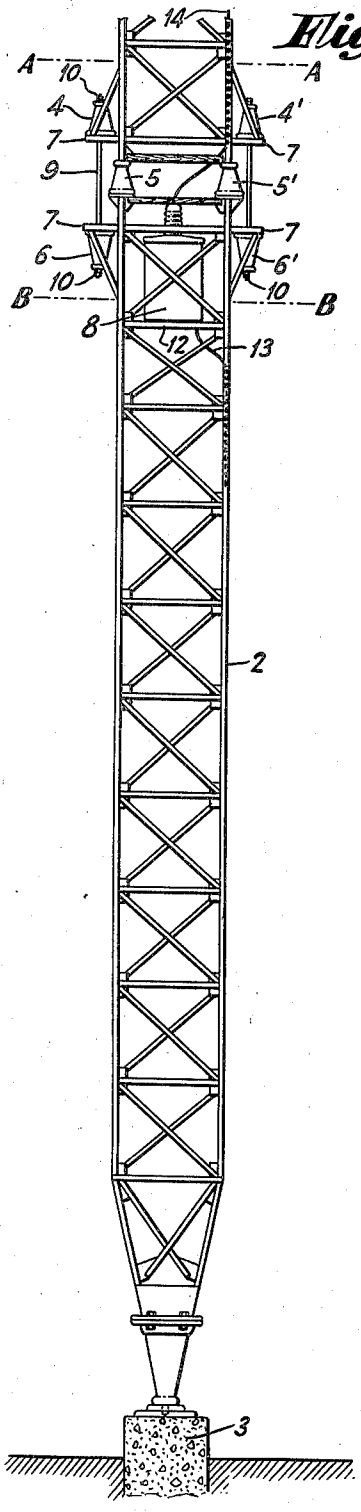



Fig. 3

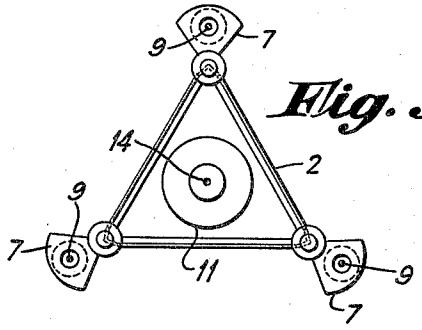
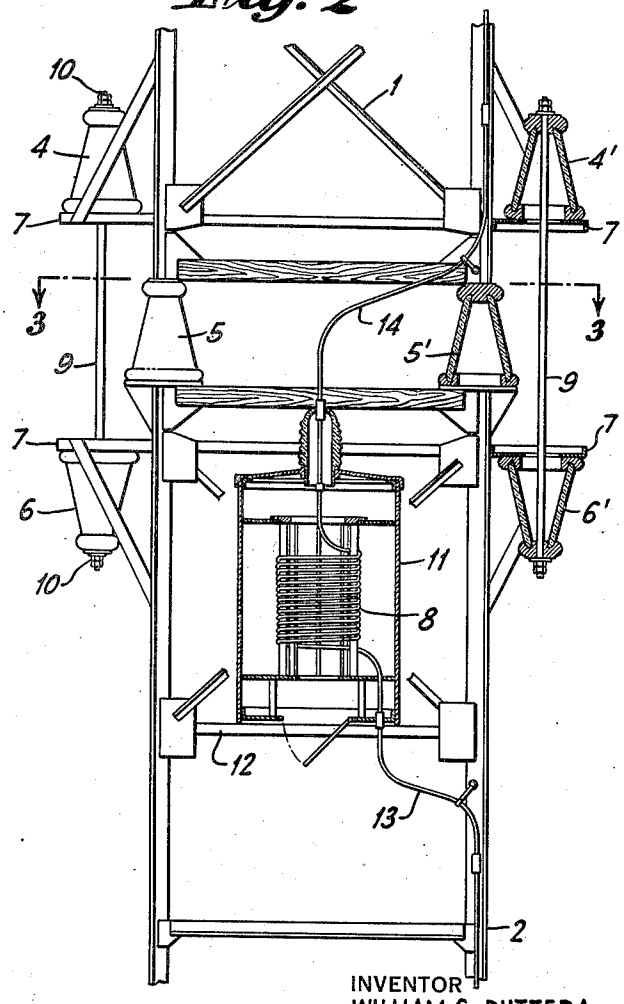



Fig. 2

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## INSULATING ARRANGEMENT FOR ANTENNAS

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6 Claims. (Cl. 250—33)

This invention relates to antennas of the vertical tower or mast type, and particularly to a method of and means for insulating the antenna sections from one another or from ground.

One of the objects of the present invention is to provide an insulating arrangement for an antenna which satisfies the following requirements: (1) Is capable of withstanding high voltages, and (2) minimizes the capacitance effects between the portions connected by the insulating arrangement.

Another object of the invention is to provide an insulating arrangement satisfying the foregoing requirements and in which the insulators are at all times under compression, and not in tension.

A further object is to provide an insulating arrangement for supporting one or more sections of a tower which is relatively economical and simple to construct.

A better understanding of the invention may be had by referring to the following description, which is accompanied by a drawing, wherein:

Fig. 1 is a diagrammatic view in side elevation of a tower or mast type of antenna embodying the preferred form of insulating arrangement in accordance with the invention;

Fig. 2 is an enlarged detail view of the insulating arrangement of Fig. 1, shown between the dotted lines A—A and B—B; and

Fig. 3 is a cross-sectional view of the arrangement of Fig. 2 along the line 3—3.

In Fig. 1 there is shown, by way of example only, any suitable type of antenna tower having a plurality of sections 1 and 2 suitably mounted vertically upon a concrete base 3. Sections 1 and 2 are shown insulated from one another by means of an insulating arrangement comprising three conical insulators 4, 5 and 6, or 4', 5' and 6', connected to each leg. These insulators may be made of any suitable material, such as porcelain, and are not limited in construction to this precise shape since, if desired, the insulators may be cylindrical in form or of other configuration. In each leg of the tower there is directly inserted one of these insulators 5 or 5', as shown. The other two insulators associated with each leg of the tower, such as 4 and 6, are arranged above and below the first insulator and back to back with their bases each securely mounted to a platform 7 and with their small ends or caps connected together by means of a rod 9. Rod 9 is threaded at both ends and held in tension by means of nuts 10 threaded on the rod at the extremities.

The tension in rod 9 is initially adjusted by means of the nuts 10, such that under full load conditions rod 9 will remain in tension. When the leg of the tower, associated with the insulators 4, 5 and 6, is in compression, the central insulator 5 inserted in the leg will carry the load and will be in compression, and when the leg is in tension, insulators 4 and 6 carry the load in series and are also in compression.

In addition to the adjustments previously described, it is necessary to provide sufficient tension in rod 9 so that the resultant of the vertical and shear components of force on the insulator does not pass outside the base of the insulator. This applies to all three of the insulators associated with each leg of the tower. It will thus be seen that the three insulators associated with each leg are always in compression under all circumstances and never in tension.

Where the insulators are employed between adjacent sections of a sectionalized vertical tower, as shown in Fig. 1, it is often desirable to mount an inductance coil such as 8 within the tower for the purpose of electrically connecting the adjacent sections together. This coil may take any one of several suitable forms, it being preferably mounted within a protective cover 11 which is supported on a suitable platform 12. Leads 13 and 14 are used to connect the terminals of the coil 8 to the tower structure. These leads may be clamped or welded to one of the legs of the tower.

Where a three-legged tower is employed, it will be evident that it is necessary to employ a set of insulators such as 4, 5 and 6 for each leg of the tower, making nine in all. Similarly, where a four-legged tower is employed, four sets of three insulators each will be used, making twelve insulators in all.

Fig. 2 is an enlarged view of that portion of the tower of Fig. 1 falling between dotted lines A—A and B—B. For the purpose of clarity, one set of insulators 4, 5 and 6 has been shown in side view, whereas the other set of insulators 4', 5' and 6' has been shown in section. An inspection of this figure shows that the interior of the insulators is hollow.

Fig. 3 illustrates a cross-section of Fig. 2 along the line 3—3. A three-legged tower is here employed.

One advantage of the present invention is that the insulators 4 and 6, together with the connecting rod 9, present a smaller added capacity between tower sections 1 and 2 than can be obtained from insulators hitherto proposed. The

reason for this lower capacity between sections 1 and 2 is due to the fact that the capacity between rod 9 and the upper section 1 of the tower is in series with the capacity between the rod 9 and the lower section 2 of the tower. Since these two capacities are in series, the total capacity introduced by the presence of the insulators 4 and 6 is half of that between the rod 9 and any one section of the tower. Likewise, since insulators 4 and 6 are in series, the voltage across each insulator is nearly half the total voltage across sections 1 and 2 at the sectionalized point. When high voltage exists across the sections 1 and 2, due to high power and the electrical lengths of the tower sections, the insulator arrangement of the invention is particularly desirable since its design gives it better voltage capabilities for a particular shape than insulators of the same shape used in previous structural arrangements.

Although the invention has been particularly described with reference to insulating arrangements for connecting together two adjacent sections of a tower, it should be distinctly understood that the invention is not limited thereto inasmuch as it is applicable to a method of supporting a vertical tower on a foundation, in which case the legs of the tower below the insulator 5 or 5' would be fastened to a suitable foundation.

What is claimed is:

1. An insulating arrangement for a vertical tower antenna comprising an insulator inserted in the leg of a tower for transmitting compressive stresses from the part of the leg above the insulator to that part of the leg below the insulator, and a pair of insulators symmetrically located above and below said first insulator, and so constructed and arranged as to transmit the tensile stresses from the top part of the leg above said first insulator to that part of the leg below said first insulator, whereby all insulators are always in compression.

2. An insulating arrangement in accordance with claim 1, characterized in this that said insulators are hollow and of conical form.

3. In combination, a vertical tower leg, an insulator inserted in said leg for insulating two portions thereof from one another, second and third insulators positioned above and below said first insulator and rigidly connected to said two portions, and a metal rod attached to and connecting said second and third insulators together, such that said last two insulators are in compression.

4. In combination, a vertical multi-legged tower, an insulating arrangement for each leg of said tower, said insulating arrangement comprising a first insulator inserted in its associated leg for insulating two portions thereof from one another, and second and third insulators positioned above and below said first insulator and rigidly connected to said two portions of said associated leg, and a metal rod attached to and connecting said second and third insulators together, such that said last two insulators are in compression.

5. In combination, a multi-legged tower having an upper section and a lower section, an insulator inserted in each of said legs for insulating said two sections from one another, a pair of other insulators for each of said legs positioned above and below the insulator inserted in each of said legs, said pair of insulators being rigidly connected to said two sections, and a metallic rod attached to and connecting said two insulators together, such that said pair of insulators are in compression, an inductance coil positioned within the legs of said tower, and leads extending from the terminals of said inductance coil to said sections.

6. In combination, a multi-legged tower having an upper section and a lower section, a hollow conical insulator inserted in each of said legs for insulating said two sections from one another, a pair of other hollow conical insulators for each of said legs positioned above and below the insulator inserted in each of said legs and having their bases face each other, said pair of insulators being rigidly connected to said two sections, and a metallic rod attached to and connecting said two insulators together at their small ends in such manner that said pair of insulators are in compression, an inductance coil positioned within the legs of said tower, and leads extending from the terminals of said inductance coil to said sections.

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