

Oct. 27, 1936.

W. W. BROWN
ANTENNA STRUCTURE

2,059,186

Original Filed May 25, 1934

2 Sheets-Sheet 1

Fig. 1.

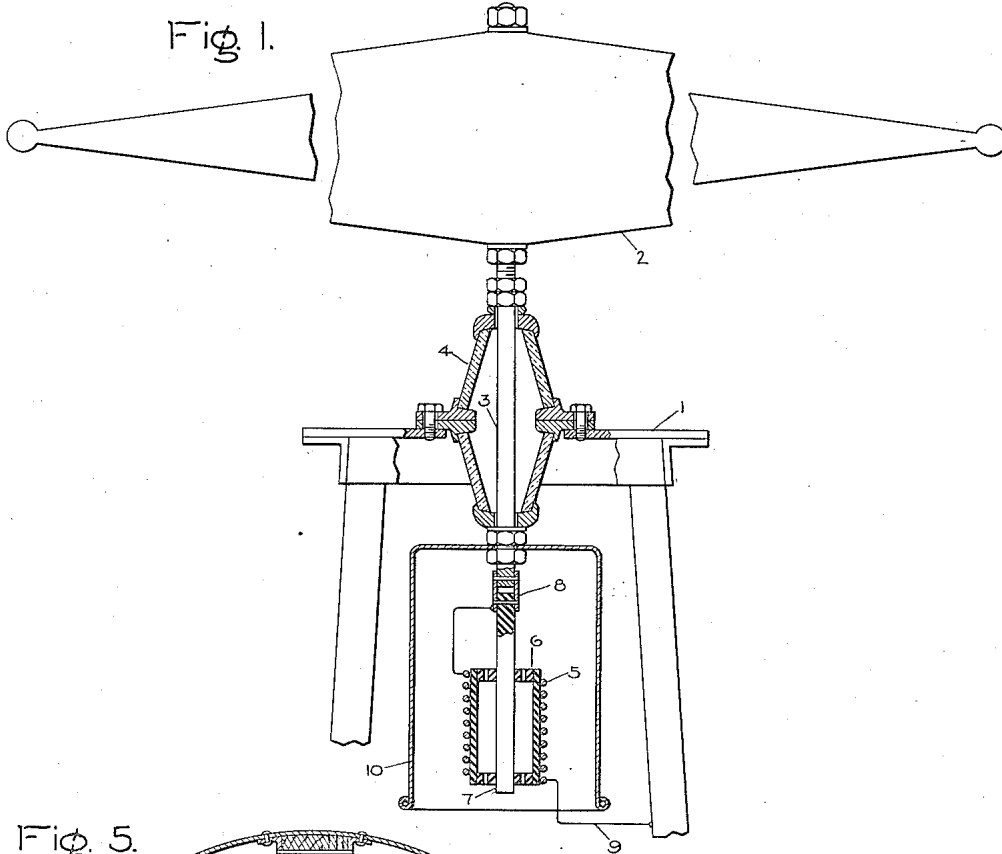
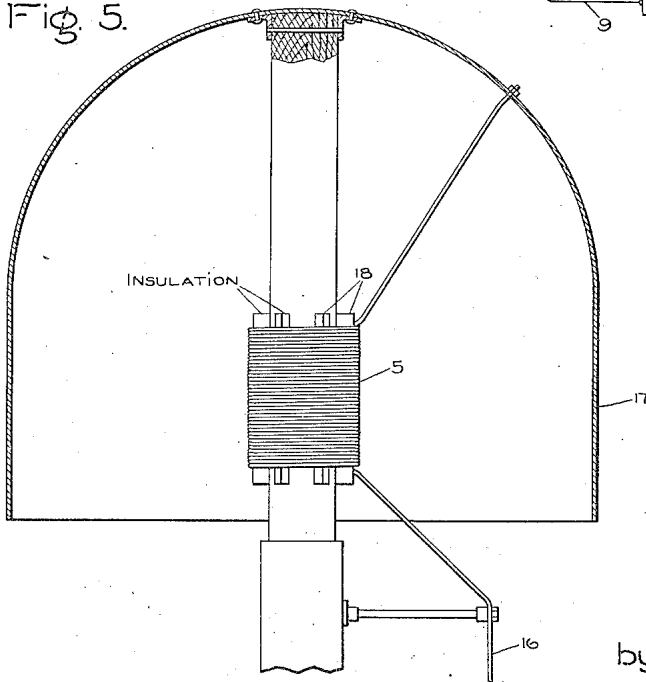


Fig. 5.



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Fig. 2.

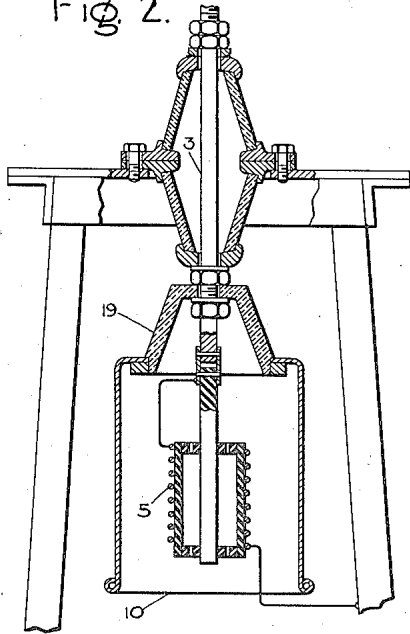


Fig. 3.

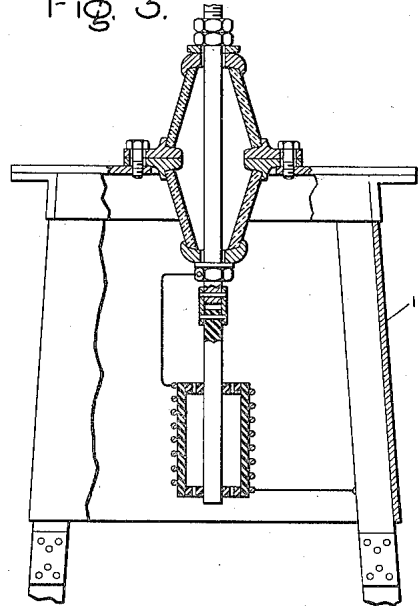
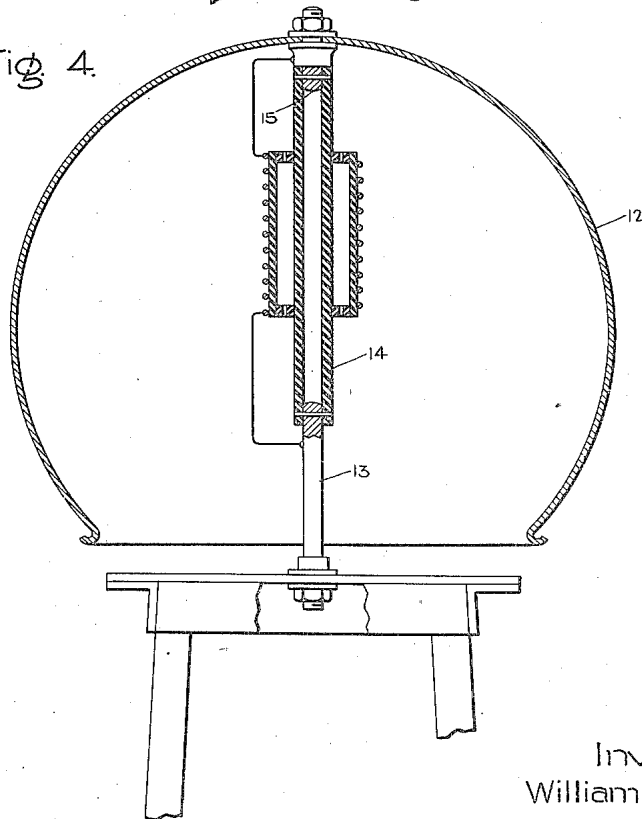


Fig. 4.



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UNITED STATES PATENT OFFICE

2,059,186

ANTENNA STRUCTURE

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to General Electric Company, a corporation of
New York

Application May 25, 1934, Serial No. 727,419

6 Claims. (Cl. 250—33)

My invention relates to antennae and more particularly to antennae of the tower or pole type.

In application Serial No. 727,409, entitled Antennae, filed simultaneously herewith by Clifford A. Nickle and assigned to the same assignee as my present application is disclosed an antenna having a capacitance area at the top. An inductance coil is connected between said capacitance area and top of the antenna whereby the total reactance between the top of the antenna and ground may be adjusted. In accordance with the Nickle invention this reactance may be adjusted from zero to high capacitive or inductive values. With such an antenna it is necessary that the capacitance area and coil be insulated from the tower and further that losses in the coil be minimized.

One object of my invention is to provide a particularly advantageous structure whereby such a coil and capacitance area may be supported from the tower and insulated therefrom, the supporting structure having sufficient rigidity to withstand the stresses caused by winds, and sufficient insulation to withstand the electrical stresses developed between the capacitance area and tower.

A further object of my invention is to provide such a construction in which capacitance effects between the tower and the portions at the top insulated therefrom are minimized.

A further object of my invention is to provide a structure in which the capacitance area and coil are supported by a single insulator.

Still a further object of my invention is to provide a structure having the above characteristics and in which losses due to proximity of the coil and tower structure are minimized.

The novel features which I believe to be characteristic of my invention are set forth with particularity in the appended claims. My invention itself, however, may best be understood by reference to the following description taken in connection with the accompanying drawings in which Figs. 1, 2, 3, 4 and 5 represent different embodiments of my invention.

Referring to Fig. 1 of the drawings, I have indicated therein at 1 the top of an antenna tower above which is supported a capacitance area of any suitable dimensions and construction. This capacitance area is supported at its central point by means of a rod 3 projecting downwardly through the top of the tower and which is supported therefrom by means of an insulator 4. This insulator may be of any suitable construction and conveniently may be one of the type

which is commonly used at the four corners of the base of a self-supporting insulated tower. As shown the insulator projects both above and below the top of the tower from which it is supported and is of such construction that metallic portions of the tower are well spaced from the conductor 3 to reduce capacity effects. Conveniently suspended from the rod 3 within the tower and below the insulator 4 is the coil 5 whereby the impedance between the top of the antenna tower and ground is adjusted in accordance with the principles set forth in the above referred to application of Nickle. This coil is wound upon a non-conducting form 6 which is attached to a non-conducting rod 7 supported from the end of rod 3 by means of the collar 8. The circuit from the top of the antenna to ground extends through the conductor 9, coil 5, collar 8, support 3, and capacitance between the capacitance area 2 and the ground.

It is very desirable in the operation of antennae in accordance with the principles outlined in the said Nickle application that the coil have a minimum of losses. A considerable portion of the losses in the coil, however, may be caused by proximity between the coil itself and the metallic portions of the tower, which commonly are of steel. This, of course, is immediately apparent when it is considered that the dimensions of the top of an elevated antenna tower are relatively small. To eliminate losses due to eddy currents set up by the coil in the tower structure, the shield 10 is provided, this shield being supported from the rod 3 and surrounding the coil 5 whereby major magnetic effects between the coil and tower are obviated. At the same time the dimensions of the shield 10 and its spacing with respect to the coil and tower may be such that detrimental capacity effects between the tower and the equipment insulated therefrom at the top are reduced. The shield also protects the coil from detrimental weather effects.

Losses in the coil are further reduced by the entire removal of all metal from the field of the coil, the coil being supported on a non-conducting form which itself is supported by the non-conducting rod 7. Preferably the metal rod 3 is terminated at a distance from the coil of at least one diameter of the coil. Similar, or greater, spacing between the coil and shield is desirable.

In Fig. 2 I have shown a modification of the arrangement shown in Fig. 1, the structure illustrated by this figure differing from Fig. 1 only in that the shield 10 is insulated from the rod 3 by

means of an insulator 19. In this way capacity effects between the tower and the insulated portion of the equipment at the top thereof are further reduced while the coil 5 is still shielded
5 from the structure of the tower.

In Fig. 3 I have shown a further embodiment of the invention in which the top portion of the tower is made of non-magnetic metal, such as copper or aluminum. This portion of the tower, as indicated at 11, completely encloses the coil 5 and protects it from detrimental weather effects. In other respects the construction of Fig. 3 is similar to that of Figs. 1 and 2.

In Fig. 4 I have shown a further embodiment of the invention which is particularly adapted for high frequency installations involving relatively small antennae, such as a small tower, or pole type antennae. The capacitance area is in the form of a sphere 12 enclosing the coil 5 and mounted above the tower 1 by means of a support comprising the metallic rod 13 and the non-conducting sleeve 14 which telescopes therewith. The sphere 12 is mounted to the top of the sleeve by means of a rod 15 projecting downward into the sleeve. The member 13 is, of course, conducting and the coil 5 is electrically connected thereto while the top of the coil is connected in any convenient way to the sphere. To minimize the amount of metal within the coil 5 and thus
30 to reduce losses within the coil, members 13 and 15 are terminated at least one coil diameter from the end of the coil, and do not extend within the coil.

In Fig. 5 I have shown a further embodiment of the invention adapted for the type of antenna comprising a vertical conductor supported by a non-conducting pole such as wood. The coil 5 is shown connected between the antenna conductor 16 and capacitance area 17 which is in the form of a hood supported by the top of the pole. The coil is conveniently supported by the pole coaxially therewith, the coil being spaced from the pole by non-conducting spacer members 18. In this way the coil is mounted centrally of the hood, is displaced from any metal, and is protected
45 from the weather.

While I have shown particular embodiments of my invention it will of course be understood that I do not wish to be limited thereto since numerous modifications may be made in the structure employed and I contemplate by the appended claims to cover any such modifications as fall within the true spirit and scope of my invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. In combination, an antenna tower, a capacitance area located above said tower, means to insulate said capacity area from said tower, an inductance coil connected between said capacity area and tower, and means to prevent eddy current losses in said tower by reason of inductive effect between said coil and tower.

2. In combination, an antenna tower, a capacitance area located above said tower, means to insulate said capacity area from said tower, a coil connected between said capacity area and tower, and means to shield said coil from said tower, said shielding means being insulated from said tower.

3. In combination, an antenna tower, a capacitance area located above said tower, a conducting support for said capacitance area projecting downwardly into the interior of said tower, a coil supported from the lower end of said support, said capacitance area and coil being insulated from said tower by a single supporting insulator between said tower and support.

4. In combination, an antenna tower, a conducting support projecting through the top of said tower, said support being insulatingly supported intermediate its ends from the top of the tower, a coil carried by the lower end of said support and connected between said support and tower, a capacitance area carried by the upper end of the support, means to shield said coil from said tower and means to insulate said shielding means from the tower and support.

5. In combination, an antenna tower, a non-magnetic top structure for said tower, a coil arranged within said non-magnetic top structure, a capacitance area mounted above said top structure and a connection from said coil to said capacitance area, said connection being insulated from said tower.

6. In combination, an antenna tower, a capacity area mounted above said antenna tower, a non-conducting support for said capacity area arranged between said capacity area and antenna tower, and a coil supported by said non-conducting support at a distance from said tower and capacity area of at least one diameter of the coil whereby said coil is sufficiently removed from conducting materials of the structure comprising said tower and capacity area to reduce losses therein to a desired degree.

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