Dec. 28, 1943. E. J. COWAN 2,337,710

ANTENNA

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Fig. 1

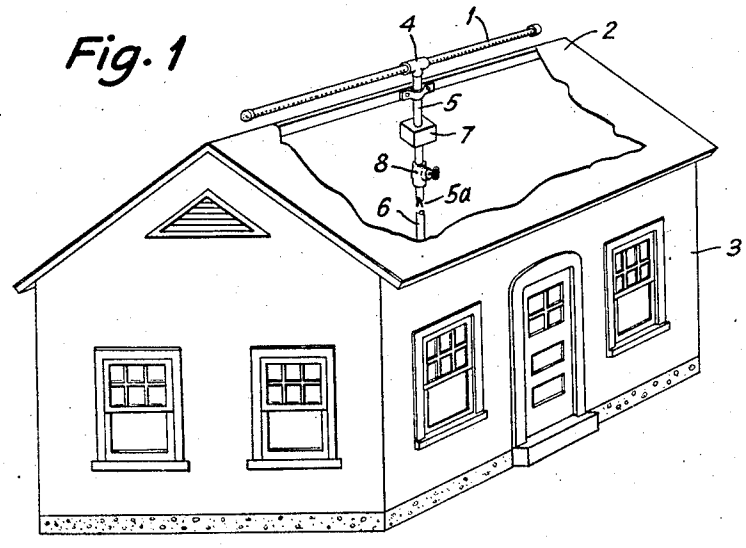
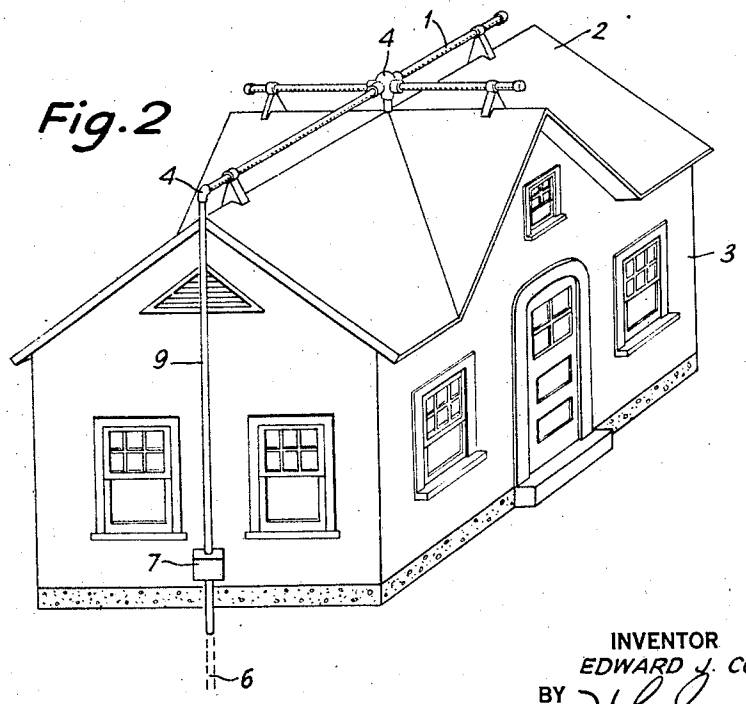


Fig. 2



INVENTOR
EDWARD J. COWAN
BY
ATTORNEY

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Fig. 3

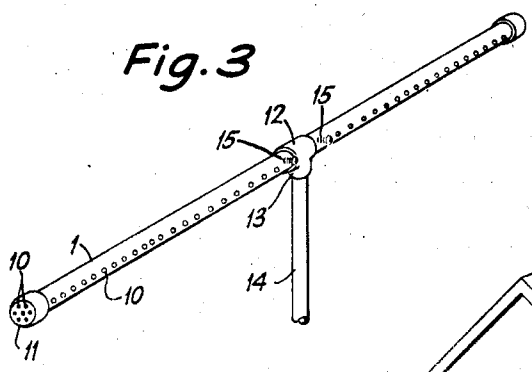


Fig. 5

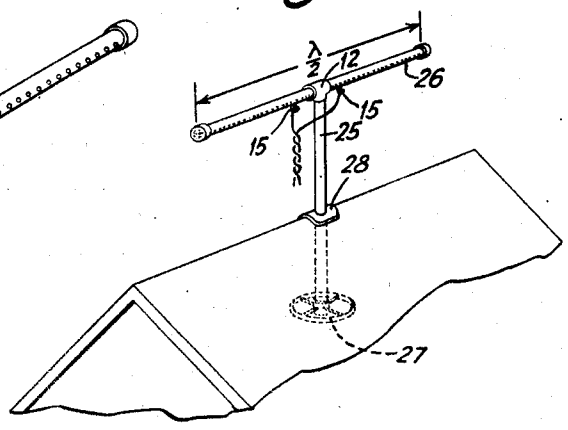


Fig. 4

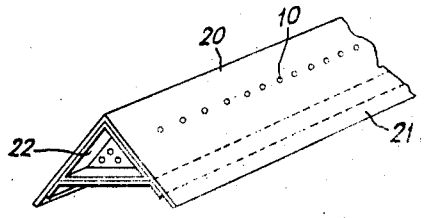


Fig. 6

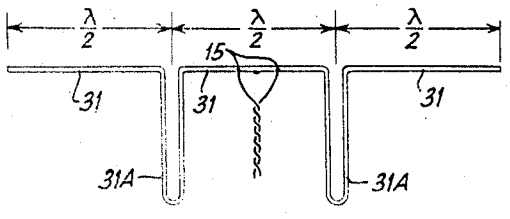
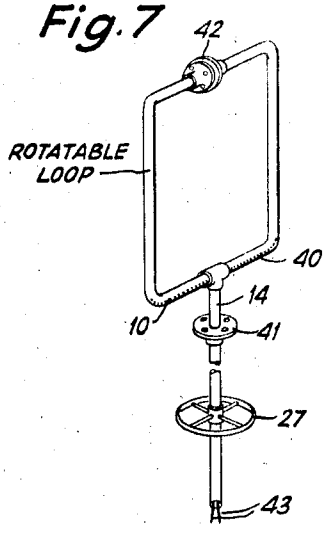


Fig. 7



INVENTOR
EDWARD J. COWAN
BY H. B. Sawyer
ATTORNEY

Patented Dec. 28, 1943

2,337,710

UNITED STATES PATENT OFFICE

2,337,710

ANTENNA

Edward J. Cowan, Springdale, Conn., assignor to Radio Corporation of America, a corporation of Delaware

Application November 1, 1941, Serial No. 417,429

17 Claims. (Cl. 250—33)

This invention relates to a frequency modulation and television antenna which in addition to being adapted for the improvement of reception of signals also gives additional uses.

An object of this invention is to improve the reception of radio signals by means of a liquid path which is either continuously or intermittently placed as required adjacent an antenna radiating member.

Another object of this invention is to provide a novel and improved antenna which can also be used as a cooling system for the home.

Still another object of this invention is to provide fire and lightning protection for the home.

A feature of this invention is the arrangement of a dipole antenna on the roof of a house or any other type of building. The radiating portion of the antenna has a plurality of small holes arranged therealong to act as a sprinkler system to allow a flow of water over the surface of the roof to improve the reception qualities and also to cool the building in hot weather, likewise, to give a certain amount of fire protection.

It has been observed that radio reception of signals has been improved when a grounded capacitive element is placed adjacent the antenna, also the present-day system of television and frequency modulation requires a specially constructed antenna located preferably at a high position above the building in which the radio apparatus is located if satisfactory reception is to be obtained. The improved antenna of this invention will perform other valuable uses around the house other than that of the reception of signals. The home owner, therefore can get improved results and other advantages from an antenna of this invention by installing a specially constructed antenna on his house.

The invention is also believed to be valuable in its application to military buildings because of the need for radio communication, and also limited fire protection because of the danger of incendiary bombs.

This invention will best be understood by referring to the accompanying drawings, in which:

Fig. 1 shows the antenna of this invention applied to an ordinary building;

Fig. 2 shows another modification of this invention applied to a dwelling house or similar building having a plurality of gables;

Fig. 3 is a detail of the hollow antenna member of this invention;

Fig. 4 shows another detail of an antenna of this invention which is particularly adapted to new building construction;

Fig. 5 shows an antenna of this invention adapted to a building having a conducting or metallic roof;

Fig. 6 is another detail of an antenna construction of this invention; and

Fig. 7 shows a direction finder loop of this invention.

Referring now in detail to the drawings, the arrangement shown in Fig. 1 is that of an ordinary dipole or half wave antenna 1 located slightly above the ridge 2 of a wood frame house 3, army barrack, or similar simple type of building. The antenna 1 is constructed from a relatively thin walled pipe or tube having suitably arranged apertures which will be discussed in detail later, preferably made of one inch brass or copper, and may be provided with suitable insulation material 4 for separating the radiating members and providing a securing means to fasten the antenna to the building. The length of tube 1 is generally one-half wave length long, although not specifically limited thereto. The amount of insulation material or the style and number of insulators, is dependent upon the general arrangement of the building. Antenna 1 is supported by a vertical pipe 5 which passes through the roof to the interior of the building. Located adjacent the insulation material and connected to the radiating members are suitably transposed downleads 5a which extend within the building for suitable connection to radio apparatus, such as a transmitting or receiving set. The transposed leads 5a are shown located apart from pipe 5, although if the impedance of the antenna circuit will permit, the leads may be made of heavy insulation and then placed within pipe 5. Between the vertical pipe 5 and the source of water supply 6 is a lightning arrester 7 and a valve 8 which is arranged to control the flow of water from the fluid supply source 6 having sufficient fluid pressure to flow out of the apertures in tube 1. The setting of valve 8 may be such as to control the rate of fluid flow to give a desired amount of impedance.

In the operation of this device, when no fluid is flowing through the system, the signals are received as in any ordinary type of dipole or ultra-high frequency antenna. However, when it is desired to improve the reception due to dry atmospheric conditions or because the building is located in a locality where sandy or good drainage gives poor grounding qualities, the conditions may then be improved by having valve 8 opened intermittently to permit the flow of sufficient liquid to give the desired improvement. In such an

arrangement, the liquid or water path acts as a capacitive element and is similar to a counterpoise. In the case of an emergency, valve 8 is opened to the full amount until the danger no longer exists. When it is desired to cool the building in hot weather, valve 8 is opened until the desired drop in temperature is obtained. When valve 8 is open, water flows from the fluid source of supply up through the vertical pipe 5 and out through the small apertures in antenna 1 and runs down on the surface of the roof.

The arrangement shown in Fig. 2 is somewhat similar to that shown in Fig. 1, except that the antenna extends over each gable of the house, forming a turnstile or cross-shaped antenna. Although the antenna member 1 is shown forming four horizontal members which gives a phase of ninety degrees each, it is to be understood that an additional phasing member not shown, which may be equivalent to one-quarter wave length, will be required to complete the proper phasing of the system. The lightning arrester 7 in this arrangement is shown located preferably on the outside of the building and at one end thereof. The fluid connection 9 extends downward to the water supply source 6, suitable insulation 4 being provided at the necessary points of the antenna system.

Although Figs. 1 and 2 show the antenna system in permanent connection with the source of water supply, in some installations, it may be desired to have the vertical pipe connected with coupling means so that the ordinary garden hose may be connected from the city water supply to the antenna system.

Fig. 3 shows in detail the antenna tube of this invention in which there is located a plurality of small holes 10, each being located diametrically opposite one another, so as to provide a sprinkler system which, in addition to improving the antenna system, will also give suitable fire protection in any emergency, such as bombing with incendiary bombs, a fire in an adjacent building, and during the hot summer months to serve as a cooling system for cooling the roof of the house or building by having water flow out of the pipes and down the sides of the roof. Each of the extreme ends of tube 1 is provided with an end cap or plug 11. The central portion of the pipe is provided with an insulating T-shaped member 12 which has a depending portion 13 suitably arranged for connection to the vertically arranged pipe 14. Electrical connections are taken from suitable terminals located at point 15, the downleads being suitably transposed, as is well known to those skilled in the art.

The constructional detail shown by Fig. 4 is somewhat similar to that of Fig. 3, except that the antenna member 20 has a cross-section equivalent in shape to the capital letter "A," and preferably constructed of sheet copper. The two extending ends 21 are provided to act as a flashing for the construction in a new building to prevent entry of moisture within the house. A delta-shaped end plug 22 is provided to substitute for the end cap 11 of Fig. 3. Suitable insulation is provided at the central portion thereof.

The antenna constructed in accordance with Fig. 5, is particularly adapted to the use of buildings having a metallic roof which may be either flat or pitched. In this arrangement, it is preferable that the vertical hollow tube member 25 be arranged to extend one-half wave length above the ridge of the roof before receiving the antenna 26 which is one-half wave length long. As such an antenna is somewhat directional in effect, it may be desired to provide means for turning the antenna, such as, for example, a hand wheel 27 and a flange ball bearing 28. With this type of antenna, the insulation 12 may be omitted. The terminating point 15 for the transmission line should be spaced so as to provide the correct impedance match for the transmission line.

Fig. 6 shows a still further modification of an antenna having alternate half-wave radiating portions 31 and phasing loops 31*a*, whereby the directivity effect of the antenna is increased. The Carter Patent #2,237,779 shows a somewhat similar type of antenna which may also be adapted to this invention.

The invention may also be applied to a rotatable loop, as shown by Fig. 7, by having the lower horizontal member 40 arranged with suitable apertures 10 to permit the ejection of the fluid therethrough. The other constructional details, such as vertical pipe 14, may include a suitable flange bearing 41, insulation section 42, and means for rotating the loop, such as a handwheel 27 similar to that shown in Fig. 5. The loop winding is preferably constructed of heavy insulated wire with suitable transposed downleads 43.

It will be seen by such an antenna arrangement that the system will improve the efficiency, also, it can be used as a lightning rod by means of having an antenna lightning arrester located between the leads going to the radio set and ground. Furthermore, although this invention has been described as applying to a matched impedance antenna system, employing a transmission line of two conductors equally spaced and properly transposed, it will apply equally well to a system having a single wire feed. In certain antenna constructions, the system may be directly grounded and thus serve directly as a lightning rod to give suitable protection. Likewise, although this invention has been described as being adapted to a receiving antenna, it can be applied to other antenna constructions, such as the many types of directional antennae and may also be applied to transmitters having beam characteristics for use in radio direction finding, as applied to aeronautics.

This invention should not be limited to the precise modifications shown.

What is claimed is:

1. An antenna system comprising a hollow antenna member having a triangular cross-section, an insulating member located in the center portion of said hollow antenna member, a plurality of apertures located in two sides of said triangular cross-section, a liquid supply arranged in liquid communication with said antenna member, and means for regulating the rate of flow of liquid from said liquid supply to said antenna member, and means adjacent said insulating member for electrically connecting said hollow antenna member to a radio device.

2. An antenna system comprising a hollow cross-shaped antenna horizontal member, a vertical member, means for insulating portions of said horizontal member from ground or equivalent potential, said cross-shaped antenna member having a plurality of apertures therein to permit the ejection of a liquid therethrough, a source of liquid supply, said vertical member having liquid communication with said cross-shaped antenna horizontal member and said source of liq-

uid supply, and means for electrically connecting said antenna member to a radio device.

3. An antenna system comprising a hollow turnstile shaped antenna forming horizontal metallic members, a vertical member, means for insulating portions of said horizontal member from ground or equivalent potential, said horizontal members having a plurality of apertures therein to permit the ejection of a liquid therethrough, a source of liquid supply, said vertical member having liquid communication with said horizontal members and said source of liquid supply, and means for electrically connecting said antenna members to a radio device.

4. An antenna system comprising a hollow dipole antenna, a horizontal metallic member one-half wave length long, a vertical member, means for insulating portions of said horizontal member from ground or equivalent potential, said horizontal member having a plurality of apertures therein to permit the ejection of a liquid therethrough, a source of liquid supply, said vertical member having liquid communication with said horizontal member and said source of liquid supply, and means for electrically connecting said antenna to a radio device.

5. An antenna system comprising a horizontal metallic member having symmetrically arranged phasing loops, a vertical member, means for insulating portions of said horizontal member from ground or equivalent potential, said horizontal member including said phasing loops having a plurality of apertures therein to permit the ejection of a liquid therethrough, a source of liquid supply, said vertical member having liquid communication with said horizontal member and said source of liquid supply, and means for electrically connecting said horizontal member to a radio device.

6. An antenna system comprising a hollow metallic antenna member substantially one-half wave length long, said antenna member having a plurality of apertures therein, said apertures being arranged in a row and diametrically opposite each other, a liquid supply arranged in liquid communication with said hollow antenna member, a vertical member having liquid communication with said hollow antenna member, means for insulating portions of said hollow antenna member from ground or equivalent potential, a bearing for supporting said vertical member, electrical means for connecting said antenna member to a radio device, and means secured to said vertical member for rotating said hollow antenna member.

7. An antenna system comprising a horizontal rotating antenna member, a vertical member, a source of liquid supply, means for insulating portions of said horizontal member from ground or equivalent potential, said horizontal antenna having a plurality of apertures therein to permit the ejection of a liquid therethrough, said vertical member having liquid communication with said horizontal antenna and said source of liquid supply, and means for electrically connecting said horizontal rotating antenna member to a radio device.

8. The combination of a rotatable direction finder loop, including a vertical member and a horizontal member, means to insulate said horizontal member from ground or equivalent potential, the lower horizontal member of said loop having a plurality of small apertures therein, a winding within said loop, a liquid supply source in communication with said loop, a bearing for said loop, means for electrically connecting said winding to a radio device, means for rotating said loop, and means for regulating the rate of flow of said liquid interposed between said loop and said liquid supply.

9. A radio direction finder comprising a hollow loop having a plurality of conductive turns and a plurality of small apertures therein, a winding within said loop, a liquid supply source in fluid communication with said loop, a bearing for said loop, means for electrically connecting said winding to a radio device, means for rotating said loop, means for insulating portions of said loop from ground or equivalent potential, and means for regulating the rate of flow of said liquid interposed between said loop and said liquid supply.

10. A frequency modulation antenna system comprising a hollow dipole antenna, a horizontal metallic member, a vertical member, said horizontal member having a plurality of apertures therein to permit the ejection of a fluid therethrough, means for insulating a portion of said horizontal antenna member, a source of fluid supply, said vertical member being in fluid communication with said horizontal member and said source of fluid supply, and a transposed transmission feed line connected between said horizontal member and a radio device.

11. An ultra high frequency antenna system comprising a hollow metallic antenna member, means for mounting said antenna member upon a building, said metallic antenna member having a plurality of apertures therein arranged in a row to permit the ejection of a liquid therethrough, insulating means for electrically separating portions of said hollow metallic antenna member, a source of liquid supply, said hollow metallic antenna member being in liquid communication with said source of liquid supply, and means for electrically connecting said hollow antenna member to a radio device.

12. An ultra high frequency antenna system comprising a hollow dipole antenna including a horizontal metallic member and a vertical metallic member, means for securing said vertical metallic member on a building, means for insulating portions of said horizontal member from said vertical member, said horizontal member having a plurality of apertures therein to permit the ejection of a liquid therethrough, a source of liquid supply, said vertical and horizontal members being in liquid communication with said liquid supply, and means for connecting said horizontal member to a radio device.

13. The combination of a horizontal hollow metallic antenna mmeber having a plurality of small apertures therein, a liquid supply source arranged to be in liquid communication with said hollow antenna member, to permit ejection of said liquid through said small apertures and means for regulating the rate of flow of said liquid, said means being interposed between said antenna member and said liquid supply, means to electrically insulate said horizontal member from said liquid supply source, and means for electrically connecting said hollow antenna member to a radio device.

14. The combination of a horizontal hollow antenna member having a plurality of small apertures therein, a liquid supply source arranged to be in liquid communication with said hollow antenna member to permit the ejection of liquid through said small apertures, a valve for regulating the rate of flow of said liquid being inter-

posed between said hollow member and said liquid supply, and an insulating member for electrically separating the liquid supply and said hollow antenna member, and means for electrically connecting said horizontal hollow antenna member to a radio device.

15. A dipole antenna member comprising two metallic hollow members, each portion of said dipole having a plurality of small apertures therein, a closure member located at the end of each hollow antenna member, an insulation member for electrically separating each portion of said hollow antenna member, a source of liquid supply and a vertical member having liquid communication with said source of liquid supply, and means for electrically connecting said antenna member to a radio device.

16. A television antenna system comprising a hollow metallic member having a plurality of small apertures therein, said apertures being arranged in two rows which are diametrically opposite each other, a liquid supply arranged to be in liquid communication with said hollow member, means to electrically insulate said hollow antenna member from ground or an equivalent potential, means interposed between said antenna and said liquid supply for regulating the flow of said liquid therethrough, and means for electrically connecting said hollow antenna member to a radio device.

17. A television antenna comprising two hollow metallic members, means for mounting said hollow metallic members on a building, an insulating member for electrically separating portions of said hollow metallic members, liquid spray means in said hollow metallic members including two rows of apertures located diametrically opposite each other, a liquid supply arranged to be in liquid communication with said hollow metallic members for providing a liquid path on said building adjacent said antenna, and means for electrically connecting said antenna to a radio device.

EDWARD J. COWAN.