Oct. 22, 1929. L. O. MARSTELLER 1,732,690

ANTENNA SUPPORT

Filed Sept. 2, 1926

Fig. 1.

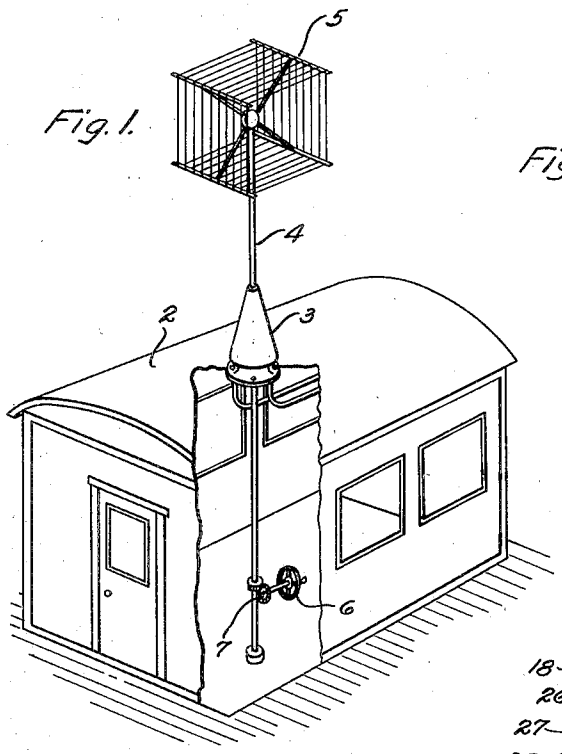
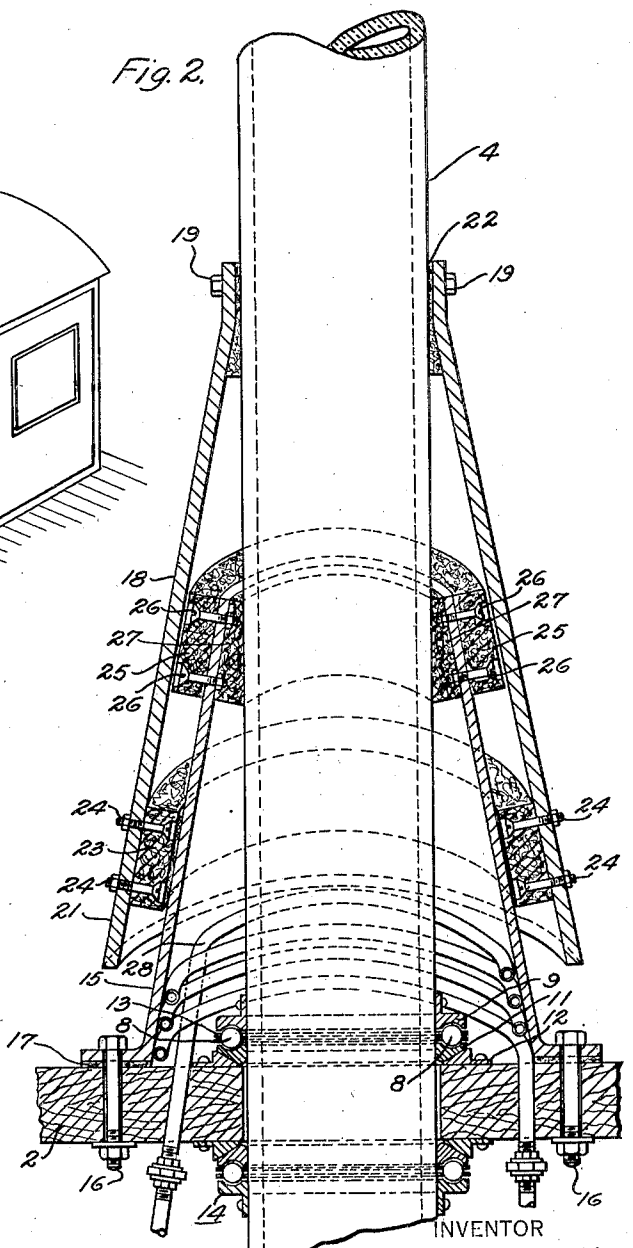


Fig. 2.



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UNITED STATES PATENT OFFICE

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ANTENNA SUPPORT

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My invention relates to antenna supporting devices, and it has particular relation to devices designed to rotatably support loop antennæ.

One object of my invention is to provide a loop-antenna support that may be turned irrespective of an accumulation of ice thereon.

Another object of my invention is to provide a loop-antenna support particularly adaptable for use in connection with direction-finding equipment on shipboard, at land stations, on dirigibles, or on aeroplanes.

The use of loop antennæ in connection with radio direction-finding equipment on shipboard becoming practically universal. These antennæ are usually mounted either on the deck of the ship, or on the roof of the cabin containing the radio apparatus, where they are freely exposed to the weather. It is customary to protect the conductors constituting the loop by a water-proof shield of dielectric material to prevent moisture from altering the constants of the loop, but in so far as I am aware no special effort has been made to design a loop-supporting device that permits an unimpeded turning of the loop under conditions causing an accumulation of ice at the location where the loop is mounted. Obviously, if the loop is to be constantly available, it is necessary to provide means whereby moisture is prevented from congealing around the point where the vertical loop-carrying shaft passes through the deck or through the roof of the radio cabin.

I have accordingly designed a loop-supporting bearing provided with water-proof protecting means, and in addition have provided a heating device to prevent the accumulation of ice between exposed portions of the protecting means.

The novel features which I consider characteristic of my invention are set forth with particularity in the appended claims. The invention itself, however, both as to its organization and method of operation, together with further objects and advantages thereof, will best be understood by reference to the following description taken in connection with the accompanying drawing, in which,

Fig. 1 is a perspective view of a ship's radio cabin, showing the manner in which my invention is applied to the vertical shaft supporting a loop-antenna for rotation, and

Fig. 2 is an elevational view, partly in section, showing a preferred form of my invention.

Referring to Fig. 1, a radio cabin, or deck-house 1, has a shielded bearing device 3 mounted on the roof 2 thereof, through which passes a vertical shaft 4 carrying a loop-antenna 5 at its upper extremity. The vertical shaft may be turned by hand-wheel 6 and a suitable train of gears 7, if desired.

In order to simplify the illustration, additional radio apparatus has not been shown.

Referring to Fig. 2, the hollow shaft 4, at the point where it passes through the roof, is supported upon a suitable bearing. This bearing may be of any conventional type, or may be constructed as shown in the drawing, in which the vertical downward thrust of the shaft caused by its weight is carried by a plurality of balls 8 rotatable between an upper race 9 affixed to the shaft and a lower race 11 supported by a circular member 12 affixed to the roof. A plurality of retaining rings 13 provided with openings maintain the balls in proper spaced relation circumferentially.

A similar bearing 14 surrounds the shaft immediately below the point at which it passes through the roof, in order to give rigidity to the system and prevent unseating of the shaft when exposed to heavy winds and seas.

A conical skirt 15 surrounds the lower portion of the shaft 4, and is affixed to the roof by a plurality of bolts 16. A gasket 17 of felt or other analogous material, inserted between the lower edge of the skirt and the roof, prevents the access of water to the bearings.

Another conical skirt 18 is affixed to the shaft 4 by means of bolts 19, and is so arranged that the flaring portion 21 thereof encircles the upper portion of the skirt 15 which is affixed to the roof. It is not necessary in all cases that the skirt 18 be affixed to the shaft, it being obvious that if the shaft does not rotate that this skirt should be af-

fixed to the rotating portion of the loop structure. A packing ring 22 may be interposed between the shaft and the small end of the skirt 18, if necessary to prevent the ingress of moisture.

A ring 23 of water-proofed felt or analogous material is carried on the interior surface of the flaring portion 21 of the upper skirt, being affixed thereto by a plurality of bolts 24, or by other means. This ring, which makes contact with the lower skirt, and effectually closes the space between it and the upper skirt, is impregnated or treated to reduce friction and exclude moisture.

Another ring of water-proofed felt 25 is carried on the exterior surface of the upper end of the lower skirt, being affixed thereto by a plurality of bolts 26. The bolts 26 may also be utilized to support an interior ring 27 adapted to fill the space between the upper end of the lower skirt and the shaft.

A heating device, illustrated as a steam coil 28, is arranged around the lower portion of the shaft, between it and the skirt carried by the deck. This device prevents the accumulation of ice between the lower portions of the two skirts, and at the same time maintains the lower skirt at a temperature sufficiently high to prevent the lower felt ring 23 from freezing thereto.

The upper felt rings 25 and 27, being protected against moisture, need not be heated except incidentally by heat conducted to them through the lower skirt.

If desirable, electric heating means preferably comprising a non-inductive resistance coil may be substituted for the steam coil illustrated. An inductive coil might also be used, since the skirts constitute an effective shield which may be grounded if necessary.

In the operation of my device in extremely cold weather, and under conditions tending to cause an accumulation of congealed moisture around it, the loop may be rendered freely rotatable merely by energizing the heating means. Any ice which has accumulated between the lower portion of the upper skirt and the lower skirt is immediately melted, and continued application of heat prevents the further accumulation thereof. Heat is conveyed by conduction through the material of the lower skirt to all parts thereof, and any ice that has accumulated between the skirt 15 and the lower packing ring 23 is melted, as is also any ice that may possibly have formed between the upper inside ring 27 and the shaft 4. Inasmuch as the upper inside ring is very thoroughly protected, ice is very unlikely to accumulate thereon, though in extremely severe weather this accumulation is possible.

It is thus apparent that by my invention I have provided an extremely efficient protective device to be used with loop antennæ mounted in exposed positions. The device may be applied, without great expense, to antenna-supporting shafts already in use, although I consider it preferable to construct the shaft, the bearing, and the protective device as a unit.

In addition to preventing the accumulation of ice from preventing rotation of the antenna-supporting shaft, a device constructed according to my invention adds appreciably to the rigidity of the structure. Bending moments occasioned by heavy wind or by the pitching of the vessel are transmitted from the shaft to the lower skirt through the medium of the water-proofing rings, and are prevented from causing undue strain on the main supporting bearings. The reception of radio signals is also improved by the elimination of vibrations in the supporting shaft which tend to affect the inductance and distributed capacity of the loop, and disturb the tuning thereof.

In order to clearly disclose an operative embodiment of my invention, a specific form thereof has been illustrated and described. I am fully aware that many modifications will be obvious to those skilled in the art, and my invention is accordingly not to be limited except as is necessitated by the prior art and by the spirit of the appended claims.

I claim as my invention:

1. In combination, a shaft adapted to carry radiant energy receiving means, a bearing in which said shaft is mounted for rotation, bearing supporting means, shielding means for said bearing affixed to said bearing supporting means, additional shielding means carried by said shaft and cooperating with the fixed shielding means, and water-resistant packing devices interposed between said shielding means.

2. In combination, a shaft mounted for rotation in a bearing carried by a supporting device, fixed shielding means carried by said supporting device for preventing the access of moisture to said bearing, additional shielding means carried by said shaft and cooperating with the fixed shielding means, heating means for preventing the accumulation of congealed moisture at the location where the two shielding means cooperate, and water-resistant packing devices interposed between said shielding means.

3. In combination, a shaft adapted to carry radiant energy receiving means, a bearing in which said shaft is mounted for rotation, bearing supporting means, a frustro-conical shield carried by said bearing supporting means arranged to encircle said shaft and protect said bearing against the access of moisture, an additional frustro-conical shield encircling said shaft and lying in nested relation with the first mentioned shield, and packing means between said shields.

4. In combination, a shaft adapted to carry radiant energy receiving means, a bearing in

which said shaft is mounted for rotation, a shield encircling said bearing and shaft, an additional shield carried by said shaft encircling and covering said first shield, packing means between said shields, packing means between said first mentioned shield and said shaft, and means for applying heat to said first shield.

5. In combination, a shaft adapted to carry radiant energy receiving means, a bearing in which said shaft is mounted for rotation, means for applying heat to said bearing for the prevention of ice accumulations, and means for preventing electro-magnetic disturbances originating in said heating means from affecting said receiving means.

In testimony whereof, I have hereunto subscribed my name this 10th day of August, 1926.

LESTER O. MARSTELLER.