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ANTENNA MAST

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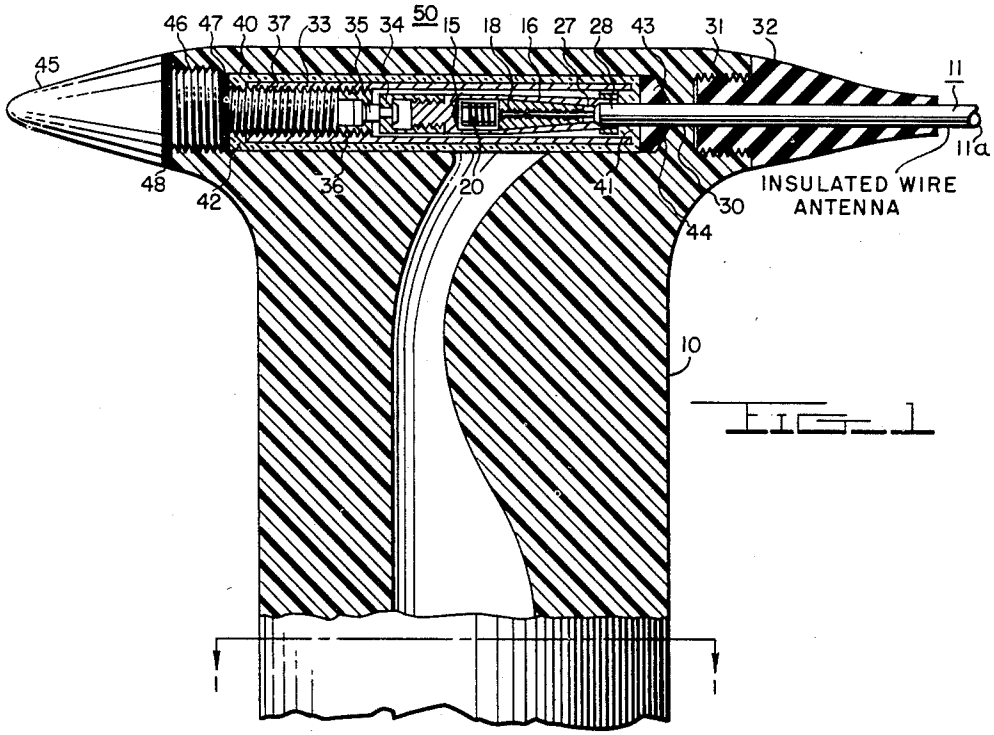


FIG. 1

FIG. 2

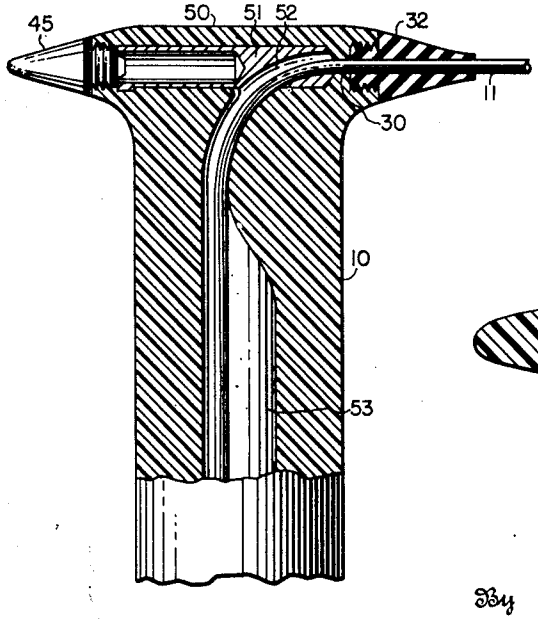
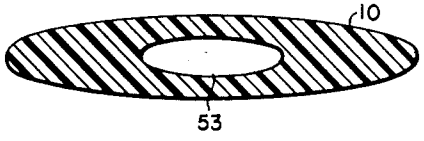


FIG. 1A



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ANTENNA MAST

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This invention relates to antenna supporting structure and more particularly to aircraft antenna masts.

A frequently encountered and highly troublesome problem experienced in the operation of airborne radio equipment is that of static interference. This phenomenon is particularly noticeable during flights through areas of precipitation. Under this condition the aircraft will become highly electrified, or charged to a potential where corona discharges occur at various points on the aircraft. When these discharges occur at such points on the aircraft as to be coupled to the antenna the attendant noise pulses introduced into the associated radio equipment are generally so severe as to render such equipment useless.

In general, most antennae structure and especially wire type antenna masts are, for reasons of aerodynamic efficiency, streamlined or formed with surfaces having small radiuses of curvature. Components having these general physical characteristics frequently go into corona discharge before other points on the aircraft. Consequently the antenna mast and associated structure are often the most prolific sources of static disturbances.

It is accordingly an object of this invention to provide an antenna mast having high voltage breakdown characteristics.

Another object of this invention is to provide an aircraft antenna mast having extremely high resistance to corona discharge.

Another object of this invention is to provide a streamlined aircraft antenna mast having the foregoing properties.

It is another object of this invention to provide a fabricated aircraft antenna mast which may be readily cut to any desired length and which by a simple alternation may serve as either a lead-in or a dead-end connection for wire type antennae.

It is another object of this invention to provide an antenna mast which may be easily and inexpensively manufactured.

Other objects and features of the present invention will become apparent upon a careful consideration of the following detailed description when taken together with the accompanying drawings, in which:

Fig. 1 is a longitudinal sectional view of one embodiment of the invention;

Fig. 1*a* is a cross-sectional view showing the general curvature and symmetry of the mast;

Fig. 2 is a longitudinal sectional view of a variant embodiment of the invention.

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Referring now in particular to Fig. 1, there is exemplified an antenna mast constructed in accordance with the principles of the invention and suitable for use as a "dead-end" connection for an insulated wire type antenna 11. As exemplified the mast comprises a body portion 10 constructed as an elongated dielectric member having a streamlined cross section somewhat as illustrated in Fig. 1*a*. The top of the mast is terminated in a generally cylindrical shaped head portion 50; the axis of said head portion being normal to the long axis of the body portion, and parallel to the axis of streamlining. In practice the body and head portions are integrally formed in longitudinal half section by a molding process. More particularly, the half sections are taken about each side of the major cross-sectional axis and then cemented together using a thermosetting resin. A plastic mixture such as fiber glass and a poly ester resin has been found to serve admirably to provide structural rigidity and high dielectric strength.

When the mast is used as a dead-end connection for a straight wire antenna as illustrated in the present figure the cylindrical head portion houses a terminal clamp for attachment to the antenna wire 11. The clamp comprises in its preferred form, a chuck assembly having a generally tubular housing 16 formed with an internal diameter of a suitable dimension at its base 15 and tapered to a smaller diameter at its throat 27. The mouth of the chuck assembly is internally recessed to a larger diameter as illustrated at 28 to accomodate the insulating sheath 11*a* of the insulated antenna wire 11. Inserted within the housing 16 are a pair of elongated semi-cylindrical metallic jaws 18 which are provided at their external surface with a taper to conform to the internal taper of the housing 16. The opposing faces of the jaws 18 are concaved and formed with a series of teeth arranged to grip the bare conductor wire of the antenna with a biting action upon insertion of the same into the chuck assembly. To insure positive gripping of the antenna conductor wire and to prevent the same from easy removal once installed; jaws 18 are urged toward one another by the joint action of the internally tapered surface of the outer housing 16 and a compression spring 20 positioned between the base of the jaws and the base of the chuck housing 16.

Entrance of the antenna conductor wire into the clamping device is made available by an opening 30 formed axially in one end of the cylindrical head portion of the mast. Fitted in screw threaded engagement at 31 with this end of the

cylindrical head portion is a flexible dielectric bushing 32 tapered to form a streamlined termination for the cylindrical portion of the mast. Bushing 32 is made from insulating material such as polyisobutylene having high dielectric strength and is provided with a central opening of such dimensions as to snugly fit the insulating sheath 11a of the antenna wire.

The terminal clamping device is supported within a tubular metallic sleeve 33. Threadably fixed to the base of the terminal clamp is a cylindrical collar 34. Attached to collar 34 such as by pin 35 is an externally threaded cylindrical member 36 which is adapted to engage the screw threads 37 formed internal to the tubular sleeve 33. The mounting of cylindrical member 36 to collar 34 by pin 35 is made such that the former is permitted to rotate freely relative to the collar 34. Member 36 may then be provided at its free end with a screw driver wrenching section or the like whereby rotation of the same will move the clamping device axially along the metal sleeve 33 to thereby provide an adjustment of the tension on the antenna wire 11.

Since cylindrical member 36 is threaded and therefore has sharp edges which are susceptible to corona discharges—it is preferred to make the tubular sleeve 33 of a metallic material whereby such sharp edges are given an effective electrostatic shield. To further insure high voltage breakdown characteristics, metal sleeve 33 is preferably encased by a sheath of insulation 40 such as by molding thereover a polystyrene covering. Insulating sheath 40 is provided at one end with a reentrant portion 41 and at its other end with an inwardly extending flange 42 whereby the ends of metal sleeve 33 may be completely insulated. The internal diameter of the reentrant portion 41 is so dimensioned as to effect a snug fit with the insulating sheath of the antenna wire 11. This same end of the polystyrene insulating sheath 40 is pressed, by means hereinafter described, into a tight fit with a wedge shaped insulating bushing 43 which is made from a rubber like dielectric material such as polyisobutylene. This portion of the cylindrical section of the mast is of course cut with a taper 44 to conform with the taper of the insulating bushing. Bushing 43 thus provides a suitable weather seal for the clamping assembly. Bushing 43 further operates to remove air pockets from around the antenna wire and thereby reduces the chances of such air pockets initiating a corona discharge.

The dummy end of the cylindrical portion of the mast is terminated by a streamlined dielectric cap 45 which is screw threaded at 46. The dielectric cap 45 has a length at its threaded portion of sufficient dimension to bear down on the end of sheath 40 to move the same into snug contact with the insulating bushing 43. Interposed between the abutting faces of cap 45 and sheath 40 is a rubber like dielectric washer 47 which aids in the formation of an air tight seal for the terminal connector. Likewise a rubber like gasket 48 is positioned between the abutting faces of the end cap 45 and cylindrical portion of the mast.

Referring now to Fig. 2 there is shown the antenna mast of Fig. 1 as applied to a lead-in termination. Herein, similar components are identified by the same reference characters as employed in Fig. 1. The mast of this figure differs from that of Fig. 1 in one principal detail, namely the wire clamping device has been omitted and a suitable dielectric plug 51 has been inserted in lieu thereof. Plug 51 is provided as a means for filling the cavity formed in the head portion 50 of the mast when the same is used as a lead-in termination as herein exemplified. A curved bore 52 is formed in plug 51 opening at one end in axial alignment with the bore 30 formed in the mast for receipt of the insulated antenna wire 11. The other end of the bore 52 communicates with a central channel 53 formed within the body portion of the mast whereby the antenna wire 11 may be led in through the tapered end fitting 32, axial opening 30, bore 52, and channel 53 through the skin of the aircraft (not shown) to a suitable anchoring point located within the aircraft.

The antenna mast supporting structure and how the same is secured to the aircraft has not been shown or described since the same form no part of the present invention. Although I have shown and described only certain and specific embodiments of the present invention it must be understood that I am fully aware that there are many modifications possible thereof without exceeding the spirit of the present invention.

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

What is claimed is:

1. In an aircraft anti-static straight wire antenna system having an antenna wire, an antenna mast therefor comprising; an elongated body portion of elliptical cross-section terminated at one end in a generally cylindrical hollow head portion the axis of which parallels the major cross-sectional axis of said body portion, said body and head portions being composed of an insulating material of high dielectric strength, a movable terminal connector disposed within said head portion and positionable therein for engaging the bare end of an insulated antenna wire and adjusting the tension thereon, an axial opening formed in one end of said head portion in communication with said terminal connector, said opening disposed for recipt of said insulated antenna wire, and a streamlined flexible dielectric member attached to said head portion and adapted to snugly surround said antenna wire at the entrance thereof to said head portion.

2. In an aircraft anti-static straight wire antenna system having an antenna wire, an antenna mast therefor comprising; an elongated body portion of elliptical cross-section terminated at one end in a generally cylindrical hollow head portion the axis of which parallels the major cross-sectional axis of said body portion, said body and head portions integrally formed of an insulating material of high dielectric strength, a terminal connector including a chuck assembly disposed within said head portion for gripping the antenna wire, an axial opening formed in one end of said head portion in communication with said terminal connector, said opening disposed for receipt of the antenna wire, a metallic sleeve member encompassing said chuck assembly and threadably engaged to the same whereby said assembly may be moved axially along the head portion to apply tension to the antenna wire, and a streamlined flexible dielectric member attached to said head portion, and adapted to snugly surround said antenna wire at the entrance thereof to said head portion.

3. In an aircraft anti-static straight wire antenna system having an antenna wire, an antenna mast therefor comprising; an elongated body portion of elliptical cross-section terminated at

one end in a generally cylindrical hollow head portion the axis of which parallels the major cross-sectional axis of said body portion, said body and head portions integrally formed of an insulating material of high dielectric strength, a terminal connector including a chuck assembly disposed within said head portion for gripping the antenna wire, an axial opening formed in one end of said head portion in communication with said terminal connector, said opening disposed for receipt of the antenna wire, a metallic sleeve member encompassing said chuck assembly and threadably engaged to the same whereby said assembly may be moved axially along the head portion to apply tension to the antenna wire, a dielectric sheathing covering said metallic sleeve, and a streamlined flexible dielectric member attached to said head portion and adapted to snugly surround said antenna wire at the entrance thereof to said head portion.

4. In an anti-static straight wire antenna system having an antenna wire, an antenna mast therefor comprising; a body portion, and a head portion at one end of said body portion, said body portion and said head portion being composed of insulating material, a movable terminal connector disposed within said head portion and positionable therein for engaging the antenna wire and adjusting the tension thereon, an opening formed in said head portion for the receipt of an insulated antenna wire, and a flexible dielectric member threadably attached to said head portion adjacent said opening and adapted to snugly surround the antenna wire for a short distance therealong.

5. In an anti-static straight wire antenna system having an antenna wire, an antenna mast therefor comprising a body portion, and a head portion at one end of said body portion, said body and head portions being composed of an insulating material, a movable terminal connector disposed entirely within said head portion and positionable therein for engaging the bare end of an insulated antenna wire and adjusting the tension thereon, and an opening formed in one end of said head portion in communication with said terminal connector for receipt of said antenna wire.

6. In an anti-static straight wire antenna system having an antenna wire, an antenna mast therefor comprising an elongated body portion, a head portion at one end of said body portion, said body and head portions being composed of an insulating material, a terminal connector including a chuck assembly disposed entirely within said head portion for engaging the antenna wire, and an opening formed in one end of said head portion in communication with said terminal connector, a sleeve member encompassing said chuck assembly and threadably engaged to the same whereby said assembly may be moved along said head portion to adjust the tension of the antenna wire.

7. For use in an anti-static long wire antenna system, an antenna mast comprising an elongated body portion, a head portion at one end of said body portion, said body and head portions being composed of insulating material, a self-locking terminal connector disposed entirely within said head portion for engaging the bare end of an insulated antenna wire, an opening in one end of said head portion in communication with said terminal connector for receipt of said insulated antenna wire, and a dielectric member attached to said head portion adjacent said opening and adapted snugly to surround said insulated antenna wire and form therewith a substantially air-tight seal at the point of entry of said wire into said head portion.

JOHN W. McGEE.

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