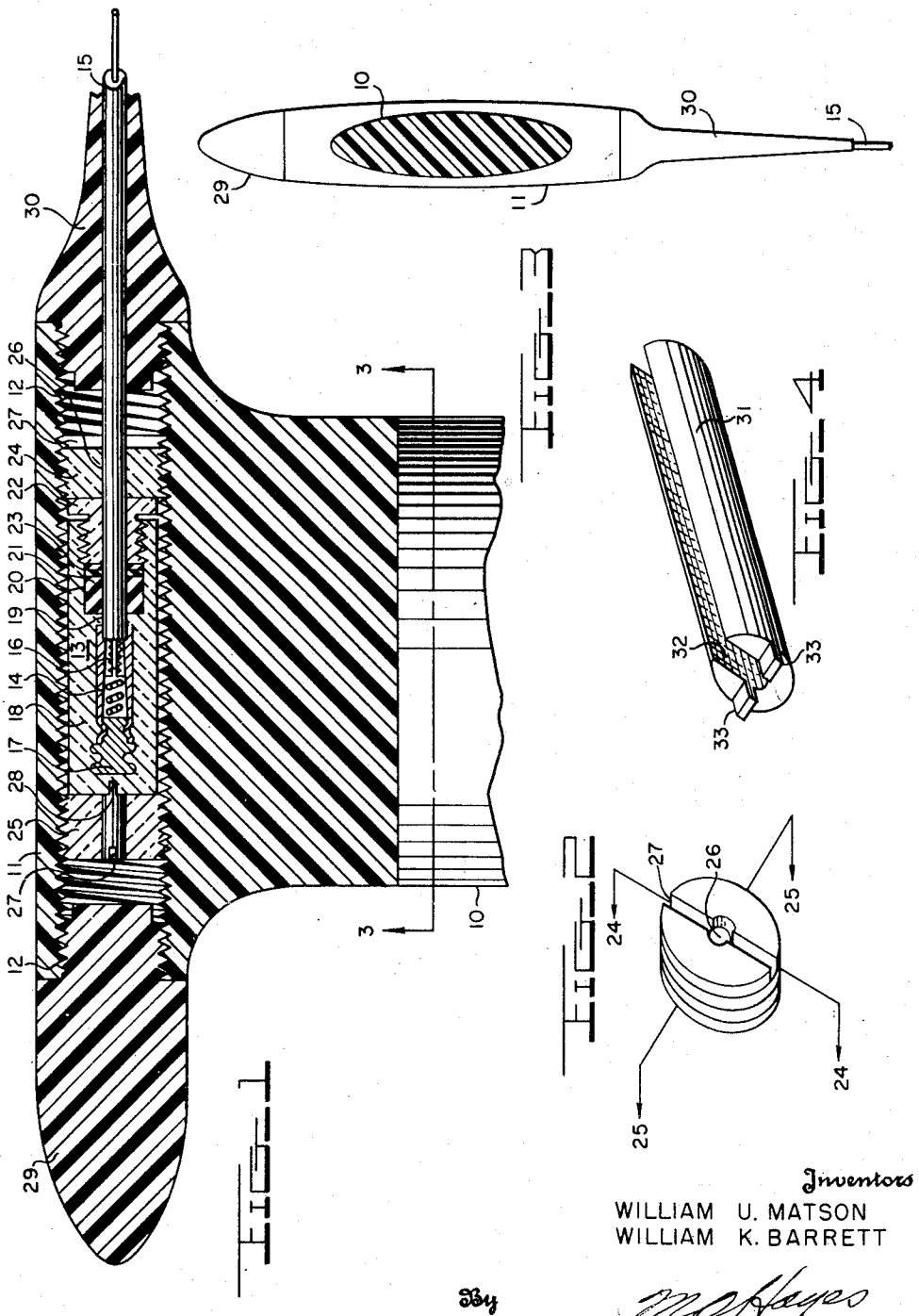
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ANTENNA MAST

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ANTENNA MAST

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1

This invention relates generally to aircraft antenna masts and more particularly to a one piece dead end mast for insulated wire antennas.

It has been found that by providing sufficient insulation on the entire antenna system of an aircraft, corona discharge at the antenna can be avoided. Under certain atmospheric conditions extremely high voltage fields build up about the exterior of an aircraft rendering the antenna very susceptible to corona discharge. A polyethylene covered antenna wire has been found to withstand over 200,000 volts but in most antenna installations it is necessary to terminate one or more ends of this antenna wire outside the aircraft and in a region of high voltage fields. For suitable mechanical termination it is necessary to strip the insulation from the wire end and grip the bare wire. This produces weak points in the system which has required the use of a high voltage seal at the wire terminations. Suitable wire terminations for strain insulators are disclosed and claimed in the copending application of H. H. Slaughter, Jr. and W. A. Von Wald, Jr. Serial Number 132,962, filed December 14, 1949, and suitable terminations for lead through insulators are disclosed and claimed in the copending application of W. A. Von Wald, Jr. and T. E. Marshall III Serial Number 99,823, filed June 17, 1949.

Where a mast type termination is desired, the mast, or at least the mast head, is generally in a high voltage field.

It is therefore an object of the invention to provide a wire termination in an antenna mast for insulated wire antennas which will withstand extremely high voltage fields.

It is another object of this invention to provide take up means in an insulated wire antenna mast which does not disturb the termination of the antenna wire.

It is another object of this invention to provide a one piece insulated dead end antenna mast suitable for terminating insulated wire antennas in regions of extremely high voltage fields.

Other objects and advantages of the invention will be apparent from the following description and accompanying drawings, in which similar characters of reference indicate similar parts throughout the several views:

Fig. 1 is a longitudinal cross section view of the mast head showing a portion of the supporting strut in elevation.

Fig. 2 is an isometric elevation view of a portion of Fig. 1.

Fig. 3 is a bottom plan view in reduced size of Fig. 1 taken along the lines 3—3.

2

Fig. 4 is an elevation view of a screw driver adapted for this invention.

Briefly, this invention provides a one piece antenna mast having a head portion and a strut portion integrally formed from laminated dielectric. The head portion includes a threaded bore normal to the strut portion. A dielectric insert fits into the bore clear of the threads and contains a wire terminal and a high voltage seal. A pair of dielectric plugs are threaded to engage the bore, one is screwed into each end of the bore to position and hold the insert therein. One end of the insert is suitably slotted so that it may be manually held from rotating while a plug is turned against it. The ends of the bore are closed off by a streamlined mast cap and lead through support.

Referring now to the drawings in detail, Fig. 1 is a side elevation view of the top end of an antenna mast constructed in accordance with this invention with the mast head and its associated components shown in cross section. The mast body 10 is of substantially flat construction and is preferably tapered toward each edge to further improve the streamlining effect of the flat construction. The tapered edges may be more readily observed from the cross sectional view in Fig. 3 taken along the lines 3—3 of Fig. 1.

The mast body 10 terminates in the mast head 11, which is a cylindrically shaped member molded integral with the mast body and disposed normal to the edges and in the plane of the streamlining thereof. A threaded cylindrical opening 12 is provided through the longitudinal center of the mast head 11. The insulated antenna wire 15 is terminated within the opening 12 as hereinafter described. Electrically, the most important part of the antenna termination is the insert 13, which is a cylindrical member having about half the length of the mast head 11, which is, in the embodiment shown, slightly longer than the edge to edge dimension of the mast body 10. The insert 13 has a diameter suitable to permit its insertion in the opening 12 without engaging the threads therein.

The insert 13 consists of a wire gripping chuck 14, containing spring loaded jaws 16 held in place by a plug 17 swaged to the chuck 14. A transparent dielectric sheath is molded around the chuck and plug to form the insert body 18. Said molded body is longer than the chuck and permits entry thereto through a pair of recesses 19 and 20. The recess 19 nearest the chuck is just large enough to receive the wire insulation 15. The other recess 20 is adjacent thereto and larger and provides a cavity for the high volt-

age seal. The high voltage seal comprises a resilient sleeve 21, compressed between the wire 15 and the walls of recess 20 by the pressure of a sealing plug 22 threaded into the outer end of recess 20. The pressure from plug 22 is transmitted to the sleeve through a plurality of dielectric washers 23. By observing the wire insulation within recess 19 through the transparent medium of the insert body 18 of an assembled insert, a perfect high voltage seal is assured.

The insert assembly is substantially identical to the wire termination and seal disclosed and claimed in the above referred to copending application of H. H. Slaughter, Jr. and W. A. Von Wald, Jr. for Strain Insulator. For convenience of manufacture it is desirable to use an identical chuck, sleeve, washers, and recess dimensions in the insert as are used in the above referred to strain insulator.

Insert 13 is positioned within the threaded opening 12 of mast head 11 by a pair of dielectric positioning plugs 24 and 25 suitably threaded to engage the internal threads of opening 12. The plug 24 at the wire end of insert 13 is provided with a central opening 26 to accommodate the insulated antenna wire 15. No opening is required in the plug 25 at the base end of the insert but same is not objectionable and for manufacturing convenience it is desirable to use identical plugs for plugs 24 and 25 as shown in Fig. 1. The positioning plugs 24 and 25 are provided with a transverse slot 27 in one end thereof to facilitate screwing same into the threaded opening 12. The slot 27 is more clearly seen in the isometric view in Fig. 2. Fig. 1 shows at 24 the the positioning plug in cross section taken along the lines 24—24 of Fig. 2, and at 25 the plug is shown in cross section taken along the lines 25—25 of Fig. 2. A similar slot 28 is provided in the base end of insert 13.

The threaded opening 12 is closed off at one end by a dielectric mast cap 29 threaded on one end to fit opening 12 and tapered at the other to provide a streamlined termination for mast head 11. The other or wire end of opening 12 is closed off by a polyethylene lead through support 30 which is also threaded to engage opening 12 and tapered from the mast head dimension at its threaded end down to that of the wire insulation. The mast cap and lead through support provide a moisture proof closure of opening 12 and lead through support 30 also provides a tapered flexibility to prevent sharp bends in the antenna wire adjacent the mast. The lead through support 30 is preferably identical with that disclosed and claimed in the above referred to copending application of W. A. Von Wald, Jr. and T. E. Marshall III for Lead Through Insulator.

To assemble an insulated wire antenna using the dead end mast of this invention, the antenna wire is cut to approximately the correct length and threaded through lead through support 30 and positioning plug 24. The wire is then threaded through seal cap 22 and the other seal components 20 and 21 and its bared end is inserted into the jaws 16. The high voltage seal is then assembled and inspected by means of recess 19. This end of the antenna is now protected from corona discharge and it remains to mount the antenna to the mast.

To accomplish this the insert 13 is inserted into opening 12 of mast head 11 and positioning plug 24 is moved down the wire and threaded into opening 12. A screwdriver (not shown) is then inserted in the other end of opening 12 to engage the slot 28 in insert 13. While insert 13 is held from turning by means of the screwdriver and slot 28, the positioning plug 24 is screwed into the mast head against plug 22 of the insert 13. By screwing plug 24, the insert is moved within the opening 12 until the desired tautness is attained in antenna wire 15.

Because of the space occupied by the antenna wire 15, an ordinary screwdriver is not suitable for advancing plug 24 into the mast head. A special screwdriver 31, suitable for this purpose is shown in Fig. 4. This screwdriver has substantially the same outer diameter as the insert body 18 and is of sufficient length to enter well into the mast head and still protrude therefrom a sufficient length for manual manipulation. Screwdriver 31 has a central opening which extends to one side thereof in the form of a slot 32 so that it may be slipped over the wire 15. A pair of driving members 33 protrude from one end of screwdriver 31 and are adapted to engage the slot 27 of positioning plug 24.

After insert 13 has been properly positioned in the mast head 11 by plug 24, the screwdrivers are removed from slots 27 and 28 and screwdriver 31 slipped off from the antenna wire. Plug 25 is then screwed into the mast head until it abuts against the insert, mast cap 29 is screwed into the mast head after plug 25 and lead through support 30 is moved along the wire and screwed into the wire end of the mast head. The assembly is then complete.

The mast and mast head are integrally molded for greater strength and are made of high dielectric material to avoid the introduction of additional corona effects to the vicinity of the antenna. In a preferred embodiment the mast was constructed of low pressure laminate composed of layers of glass mat and glass cloth impregnated with stryene copolymer. Masts constructed of this material and in accordance with this invention were found to withstand a fore and aft load of 1300 pounds and a side load of 300 pounds.

Although a specific embodiment of this invention has been herein disclosed and described, it is to be understood that same is merely illustrative of the invention and modifications may, of course, be made without departing from the spirit and scope of the invention as defined in the appended claims.

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 antenna mast assembly for adjustably holding an end of an insulated antenna wire, an elongated mast head portion having a longitudinal bore therein, dielectric insert means disposed within said bore and having a wire receiving recess therein, wire holding means disposed within said insert means and in communication with said recess, sealing means disposed within said recess whereby a seal is provided between the insulation of an inserted antenna wire and the dielectric wire and the dielectric insert, and positioning means apertured to receive an antenna wire and insertable in said bore adjacent said insert means to bear against said insert means and position it in any of a range of longitudinal positions within said bore.

2. In an antenna mast assembly for adjustably

holding an end of an antenna wire, an elongated mast head portion having a longitudinal bore therethrough, a wire holding means disposed within said bore, first and second positioning plugs one of which is apertured to receive an antenna wire, said positioning plugs being disposed within said bore on either side of said wire holding means to position it in any of a range of longitudinal positions therein.

3. In a mast assembly for adjustably holding one end of an insulated antenna wire, an open-ended internally threaded member, dielectric insert means disposed within said threaded member and having a wire receiving recess therein, wire holding means contained within said insert means in communication with said recess, sealing means disposed within said recess whereby a seal is provided between the insulation of an inserted antenna wire and the dielectric insert means, positioning means disposed within said threaded member adjacent the recess end of said insert means, said positioning means being apertured to receive an antenna wire and externally threaded to engage said threaded member and position said insert means therein, and tool engaging means at the other end of said insert means for holding said insert means against rotation while it is being positioned by said positioning means.

4. In an antenna mast assembly for adjustably holding an end of an insulated antenna wire, an elongated mast head portion having an internally threaded longitudinal bore therein, wire holding means for receiving and holding the bare end of an antenna wire, a dielectric element enclosing said wire holding means and fitting directly within said bore having a recess at one end to allow an antenna wire end to be inserted in said wire holding means, sealing means within said dielectric element adjacent one end thereof and outwardly of said wire holding means whereby a seal is provided between the insulation of an inserted antenna wire and said dielectric element, and a pair of externally threaded plug elements positioned adjustably within said bore adjacent opposite ends of said dielectric element and movable longitudinally of the bore to position said dielectric element lengthwise therein.

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