January 1948

United States Patent: Antenna Strain Insulator

Robert Katz
University of Nebraska-Lincoln, rkatz2@unl.edu

Jan. 20, 1948. R. KATZ 2,434,658

ANTENNA STRAIN INSULATOR

Filed July 25, 1944

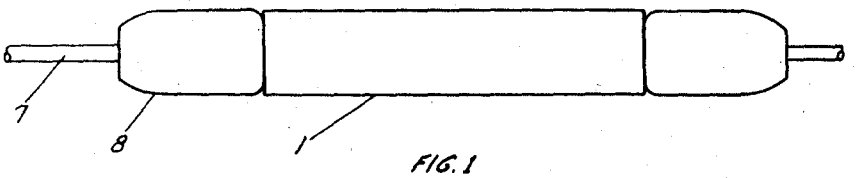

FIG. 1

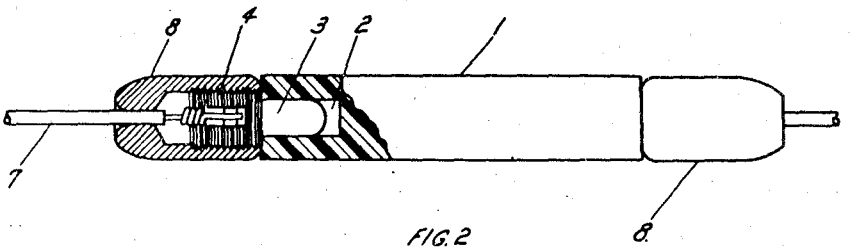

FIG. 2

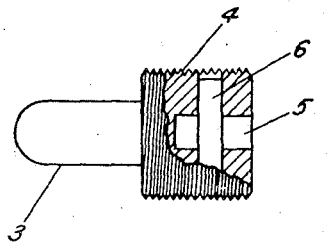

FIG. 3

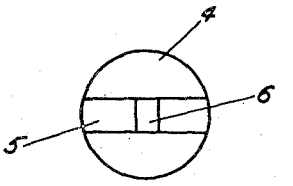

FIG. 4

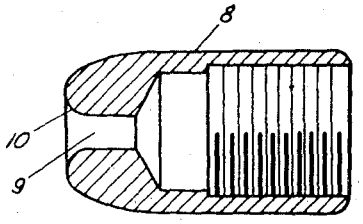

FIG. 5

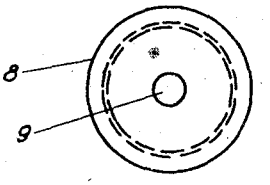

FIG. 6

INVENTOR.
ROBERT KATZ

BY
William D. Hall
ATTORNEY

Patented Jan. 20, 1948 2,434,658

UNITED STATES PATENT OFFICE

2,434,658

ANTENNA STRAIN INSULATOR

Robert Katz, Yellow Springs, Ohio

Application July 25, 1944, Serial No. 546,460

6 Claims. (Cl. 174—168)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

1

The invention described herein may be manufactured and used by or for the Government for governmental purposes, without the payment to me of any royalty thereon.

The invention to be hereinafter described relates to insulators and more particularly to strain insulators for wire antennas.

It has long been common practice to use with antenna wires on airplanes the well known porcelain or ceramic insulator, the wire ends being looped through or about the insulator, and brought back and twisted about the wire to tie, anchor or securely attach or fasten the insulator to the antenna. This produces small wire-end surfaces or other small wire surfaces, where the wires are wound or twisted, which under certain atmospheric conditions are favorable to corona discharges. When the corona discharge is produced on a plane it frequently completely obscures, submerges or, in substance, blanks out the signals of the radio so that the radio set of the plane becomes, practically, useless. The atmospheric conditions conducive to such corona discharge are frequently encountered by airplanes, especially when flying at high altitudes. Obviously, it is extremely important that the radio sets of planes should function well under such adverse conditions.

The main objects of the present invention are to overcome the above and other objections and provide a simple, efficient, and compact strain insulator which may be produced in quantity at low cost.

In order to more clearly disclose the construction, operation and use of the invention, reference should be had to the accompanying drawings forming part of the present application.

Throughout the several figures of the drawings like reference characters designate the same parts in the different views.

In the drawings:

Fig. 1 is a side elevation of a preferred form of the invention;

Fig. 2 is a view similar to Fig. 1 with portions broken away and longitudinally sectioned to show the interior construction of the insulator;

Fig. 3 is an enlarged side elevation of one insert, partly in section;

Fig. 4 is a right end view of Fig. 3;

Fig. 5 is a longitudinal cross section of the cap; and,

Fig. 6 is a left end view of Fig. 5.

Referring to the drawings in detail, 1 indicates the ceramic body of the insulator which, as is

2

well understood, is inserted in the antenna wire in such manner as to insulate it from the skin of the plane, while, at the same time, sustaining the strain imposed on the antenna. Where, as is frequent and common practice, the antenna wire is connected to the plane at more than one point, there will be a corresponding number of strain insulators included, one for each such connection. Each end of the insulator is provided with a bore 2 adapted to receive the shank 3 of an insert, a suitable cement being applied to anchor the inserts firmly in place in the bores 2. The inserts are formed as short threaded cylinders 4 with shanks 3, the cylindrical portion being of appreciably less diameter than the insulator body 1. The cylindrical portions 4 are diametrically slotted as at 5. Anchoring pins 6 extend through the cylindrical portions 4 between the outer and inner ends of the slot. Preferably, pins 6 extend substantially at right angles to the direction of slot 5 and approximately diametrically of each cylindrical portion 4 through a passage provided in said portion. The end of an insulated antenna wire 7 is looped about the anchoring pin or post 6 and wound or tied about itself as indicated in the drawings. A tubular or cylindrical internally threaded metal cap 8 covers each end of the device. It is provided with an axial hole, bore or opening 9 through which the antenna wire or the connecting wire, as the case may be, leads. It will be noticed that the cap 8 is of greatly increased diameter relatively to the ends of antenna wire 7 and that the outer end through which the wire enters is smoothly rounded. This provides a large conductive surface greatly minimizing all possible corona effects resulting from known types of connections between the strain insulator and the antenna. Cap 8 constitutes a shield. After the wire end has been securely tied to the post or pin 6, cap 8 is turned down tight on the end of the insulator body 1. It will be already seen, especially from Fig. 2, that there are no fine ends of the antenna wire outside of cap 8 and, therefore, no such surfaces exposed as would be conducive to production of the corona effects hereinabove referred to. All wire ends as well as the windings of the wire, twisted wire, and other similar surfaces more or less conducive to production of corona effects are completely enclosed and shielded or damped against such results. Consequently, such corona effects as may be produced under the requisite atmospheric conditions are, at least, greatly minimized by the present invention.

While the invention has been described particularly with reference to antenna wires it will be well understood that it is not in any sense limited to that application. It may be used in any case where there is an electric conductor element in the nature of a wire, cable or rod under strain and it is desired to insert in it or between it and some other element an insulator capable of sustaining the strain of the conductor element. Obviously, there would be detailed modifications or adjustments to meet the particular circumstances, without, however departing from the invention herein disclosed.

In the preferred form of the invention, the body 1 and cap 8 are of substantially the same diameter, throughout with the end portions of the cap 8 rounded to prevent corona effects. The cylindrical form is preferred as presenting less air resistance in use and being economical to manufacture. It will, however, be obvious that the invention may be made in various other shapes such as of elliptical oval, lobed, rectangular star or other cross section. Few if any of these variations, however, are as satisfactory as the cylindrical form. It will also be well understood that the cap connection need not be by screw threads. Many other ways of connecting may be resorted to such as slip fit or friction grip, bayonet-slot and pin connections, spring finger and rib, etc. The anchoring means has been disclosed as an insert cemented in the body 1. Clearly that means and the body 1 may be made integrally. Likewise the slot 5 and pin 6 may be replaced by a simple bore or perforation in the same direction as slot 5, with recesses or notches allowing the wire to seat in the sides of the insert. A dove-tail or mortise and tenon connection, also could be used. Likewise, a wide range of other connecting devices, both separate and integral, may be used to accomplish the same results in the way of connecting the respective wire end to the body of the strain insulator.

The important consideration is that the conductor shall have proper and sufficient connection with the insulator, the connection being adequately enclosed and shielded in such manner as to amply protect the connection against the corona effects resulting from certain atmospheric conditions.

It is thought that the construction, operation and use of the invention will be clear from the preceding detailed description.

Changes may be made in the construction, arrangement and disposition of the various parts of the invention within the scope of the appended claims without departing from the field of the invention and it is meant to include all such within this application wherein only one preferred form has been disclosed purely by way of illustration and with no thought of, in any degree, limiting the invention thereby.

Having thus described my invention, what I claim and desire to protect by Letters Patent is:

1. A strain insulator for an antenna wire comprising an elongated insulating body provided with an enclosed bore extending axially inwardly from one end, an insert extending into and anchored within said bore and provided with an externally threaded portion extending beyond said insulating body concentrically relatively to the longitudinal axis of said insulating body, said threaded portion being provided with a diametrical channel extending axially inwardly thereof, an anchoring pin to which said wire may be secured disposed diametrically of said threaded portion and across said channel and spaced from the ends of said channel, and a tubular cap internally threaded to receive the threaded portion of the aforesaid insert, said cap being provided with an axial bore extending therethrough to the interior thereof, the outer portion of said bore and the exterior of said cap being of smooth contour, free of sharp corners, and completely shielding the connection between the wire and the pin, the insert, pin, and cap being of conducting material.

2. A strain insulator for an antenna wire comprising an elongated insulating body provided with an enclosed bore extending axially inwardly from one end, an insert extending into and anchored within said bore and provided with an externally threaded portion of less diameter than and extending axially beyond said insulating body and concentrically relatively to the longitudinal axis of said insulating body, said threaded portion being provided with a diametrical channel extending axially inwardly thereof, an anchoring pin to which said wire may be secured disposed diametrically of said threaded portion and across said channel, and a tubular cap of approximately the same exterior diameter as that of the aforesaid insulating body and internally threaded to receive the threaded portion of the aforesaid insert, said cap and body in assembled relation presenting a continuous streamlined construction, said cap being provided with an axial bore therethrough to the interior thereof and in alignment with the aforesaid anchoring pin, the entire free end of said cap being rounded and the exterior of said cap being of smooth contour, free of sharp corners, and completely shielding the connection between the wire and the pin, the insert, pin, and cap being of conducting material.

3. A strain insulator for an antenna wire comprising an elongated insulating body provided with an enclosed bore extending axially inwardly from one end, an insert extending into and anchored within said bore and provided with an externally threaded portion of less diameter than and extending axially beyond said insulating body and concentrically relatively to the longitudinal axis of said insulating body, said insert being provided with wire anchoring means, and a tubular cap of approximately the same exterior diameter as that of the aforesaid insulating body and internally threaded to receive the threaded portion of the aforesaid insert, said cap and body in assembled relation presenting a continuous streamlined construction, said cap being provided with an axial bore therethrough to the interior thereof and in alignment with the aforesaid wire anchoring means, the entire free end of said cap being rounded and the exterior of said cap being of smooth contour, free of sharp corners, and completely shielding the connection between the wire and the pin, the insert, pin, and cap being of conducting material.

4. A strain insulator for antenna wire for minimizing corona effects comprising, in combination, a solid insulator body having a bore extending into the body from each end, an insert of electrical conducting material for each end including a projecting shank which is inserted and anchored in said bore and body portion enlarged relatively to said shank with a slot formed in said body portion and provided with a passage therethrough positioned transversely with respect to said slot, an anchoring pin of conducting material in said passage and across said slot to which

the end of said wire may be secured, a cap of electrical conducting material arranged to fit over said insert and retain said pin therein and provided with a rounded hole receivable to said wire, said hole and slot being aligned with one another, the exterior of said cap being of smooth contour free from sharp corners and completely shielding the connection with the wire held by said anchoring pin.

5. A strain insulator for antenna wire for minimizing corona effects comprising, in combination, a solid insulator body of cylindrical form having a bore extending into the body from each end, an insert of electrical conducting material for each end including a projecting shank for insertion and anchoring in said bore, and having a body portion enlarged relatively to said shank with a slot formed therein extending from a surface of said insert opposite that of said shank and transversely of the body portion, said body portion being shouldered to abut against said insulator when said shank is in the bore and provided with a passage therethrough positioned transversely with respect to said slot, an anchoring pin of conducting material disposed in said passage and across said slot and to which said wire may be looped, a cap of electrical conducting material arranged to fit over said insert and retain said pin therein, said cap having a rounded hole through its end for the passage of said wire therethrough, said hole and slot being aligned with one another to facilitate said attachment, said cap being longer than the body portion of said insert to provide an internal space beyond the end of said body portion, the exterior of said cap being of smooth contour free from sharp corners and completely shielding the connection with the wire held by said anchoring pin, to eliminate corona tendencies arising from said wire at the insulator.

6. A strain insulator for antenna wire for minimizing wrong effects comprising, in combination,

a solid insulator body of cylindrical form having a bore extending into the body from each end, an insert of electrical conducting material for each end having a shank for insertion and anchoring in said bore and including a screw-threaded cylindrical body with the shank extending axially therefrom, said cylindrical body having a transverse slot adjacent its surface opposite to that from which the shank projects and a hole leading to said slot from the circumferential surface of said cylindrical body, an anchor pin of electrical conducting material insertable in said hole and transversely disposed through said slot and about which pin the said wire may be looped, an internally screw-threaded cylindrical cap of electrical conducting material arranged to screw onto said insert and having its cylindrical surface substantially of the same diameter as said insulator body, its end portion being rounded towards an axial hole provided in the cap for the placement of said wire therethrough, said cap being long enough to provide a space within it beyond said insert, the cap being of relatively large external peripheral size compared with said wire and formed to provide a smooth conductive surface sufficient to minimize corona effects.

ROBERT KATZ.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,114,366	Knauff	Oct. 20, 1914
1,177,920	Brinton, Jr.	Apr. 4, 1916
1,467,713	De Voe	Sept. 11, 1923
1,543,508	Neal	June 23, 1925
1,580,463	Bean	Apr. 13, 1926
1,707,054	Doelter	Mar. 26, 1929
1,750,352	Phillips	Mar. 11, 1930
2,145,111	Duvoisin	Jan. 24, 1939