# United States Patent

[11] 3,586,758


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[21] Appl. No. **873,973**
[22] Filed **Nov. 4, 1969**
[45] Patented **June 22, 1971**



[73] Assignee **A. B. Chance Company**
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[54] **INSULATED CANTILEVER STANDOFF CONDUCTOR SUPPORT**
**23 Claims, 37 Drawing Figs.**


[52] **U.S. Cl.** ..... **174/158,** 174/169, 174/179, 174/209
[51] **Int. Cl.** ..... **H01b 17/14,** H01b 17/60
[50] **Field of Search** ..... 174/45, 148, 149, 150, 158, 163, 168, 169, 171, 174, 176, 177, 178, 179, 181, 186, 194, 195, 209



[56] **References Cited**

UNITED STATES PATENTS

| | | | |
|---|---|---|---|
| 2,175,336 | 10/1939 | Austin | 174/179 X |

FOREIGN PATENTS

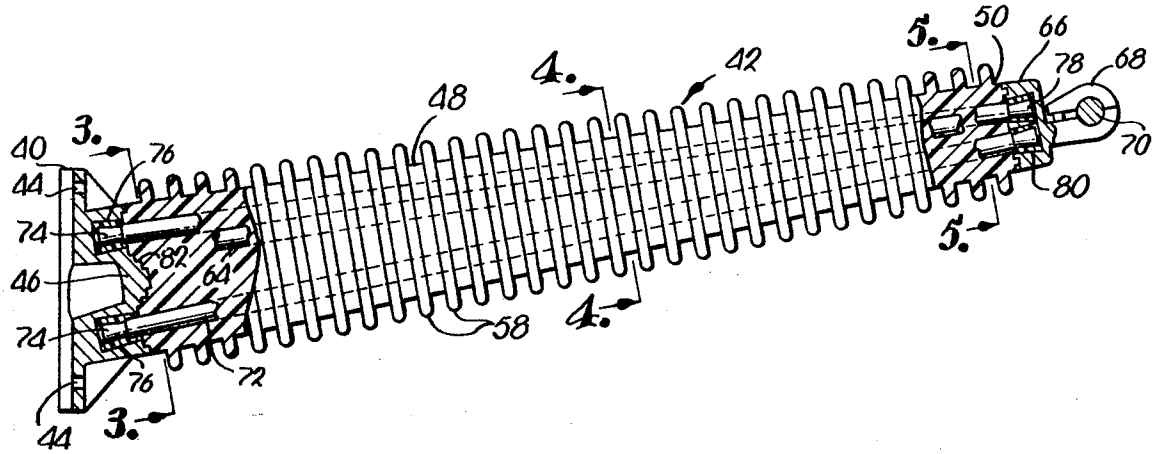
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|---|---|---|---|
| 239,985 | 8/1962 | Australia | 174/194 |
| 1,361,719 | 4/1964 | France | 174/45 |
| 466,396 | 1/1969 | Switzerland | 174/179 |



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*Attorney*—Schmidt, Johnson, Hovey & Williams



**ABSTRACT:** A cantilever standoff for supporting a conductor in laterally spaced relationship to a line pole. A base member is attached to the pole and a standoff arm extends outwardly therefrom, its outboard end being provided with a suitable conductor support. The arm has a tapered, insulating body of synthetic resin material of progressively greater cross-sectional area toward the base member, and one or more longitudinally extending, load-bearing rods of uniform individual cross section are disposed within the body to increase its tensile strength and, in some forms of the construction, its compressive strength as well. The rods are composed of a synthetic resin that is longitudinally reinforced by glass fibers, the ends of the rods being rigidly anchored in the base member and the outboard conductor support. The body is provided with a series of integral skirts over its length to increase resistance to flashover. The base member may be specially configured to transmit shear stresses thereto.

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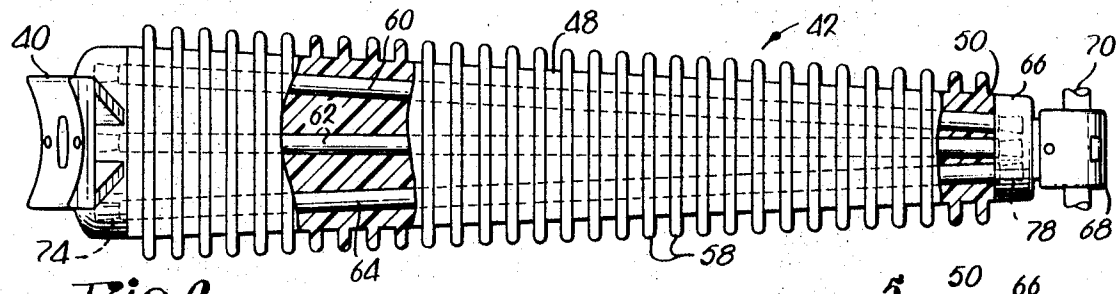



Fig.2.

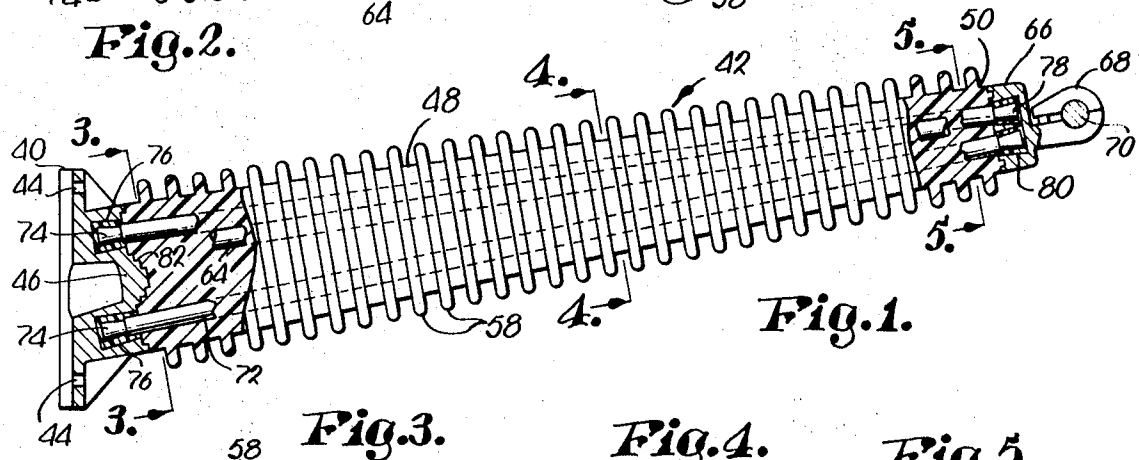



Fig.1.

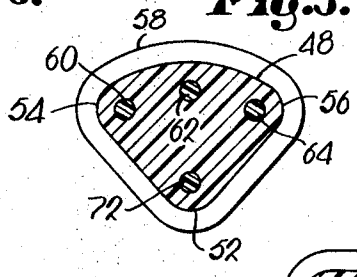



Fig.3.

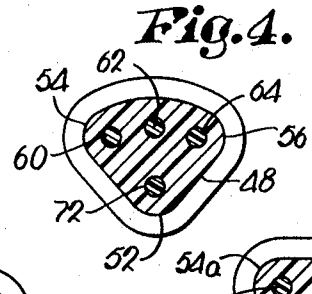



Fig.4.

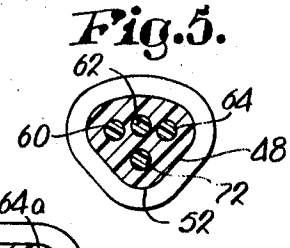



Fig.5.

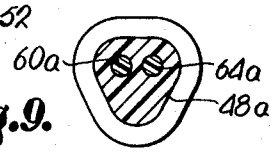



Fig.9.

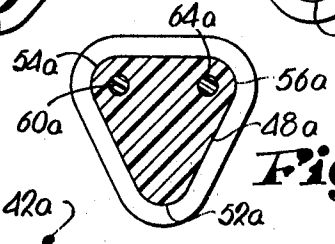



Fig.8.

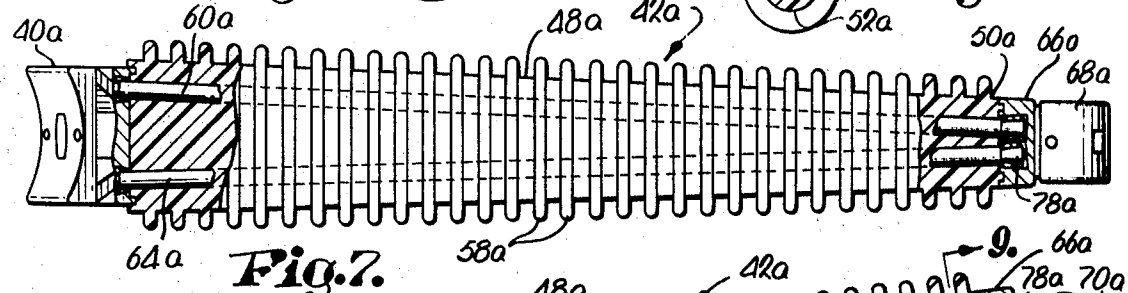



Fig.7.

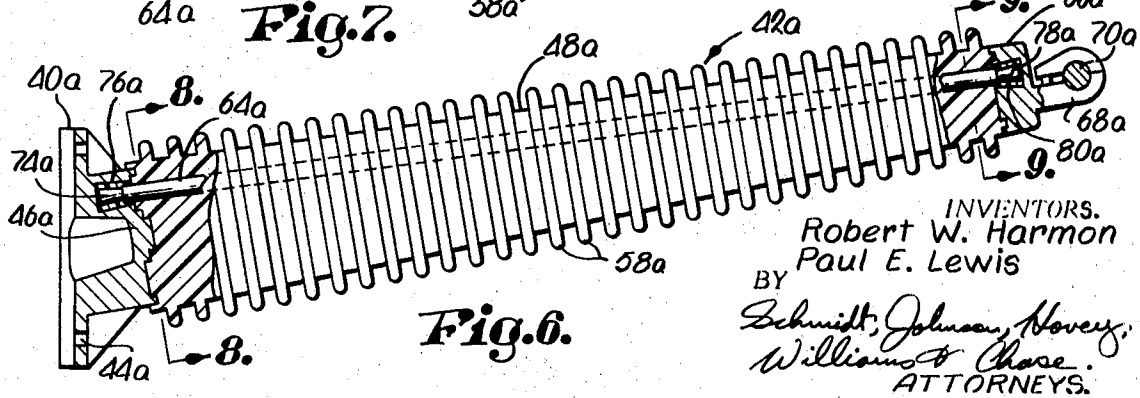



Fig.6.

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Fig.10.

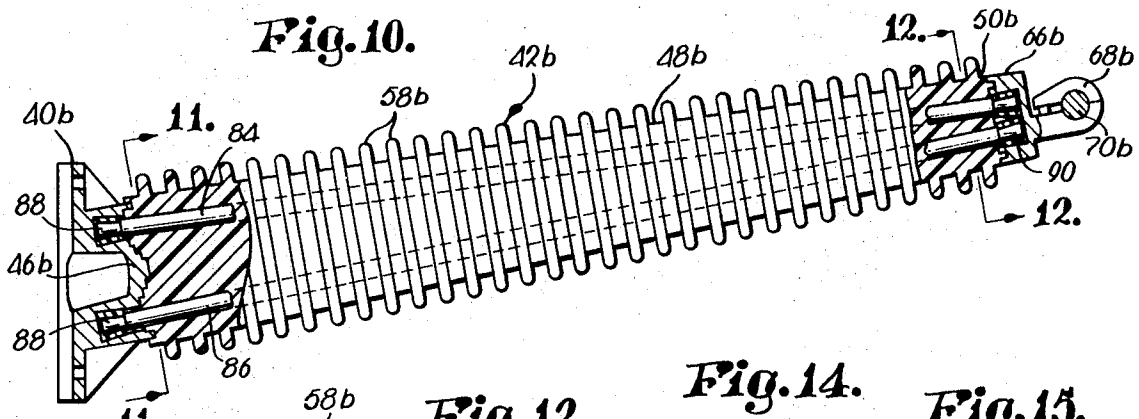



Fig.11.

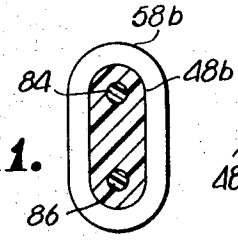



Fig.12.

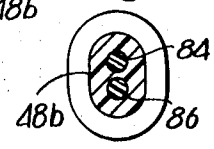



Fig.14.

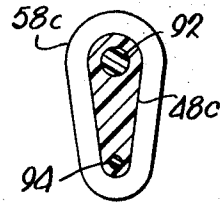
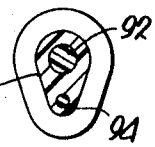



Fig.15.



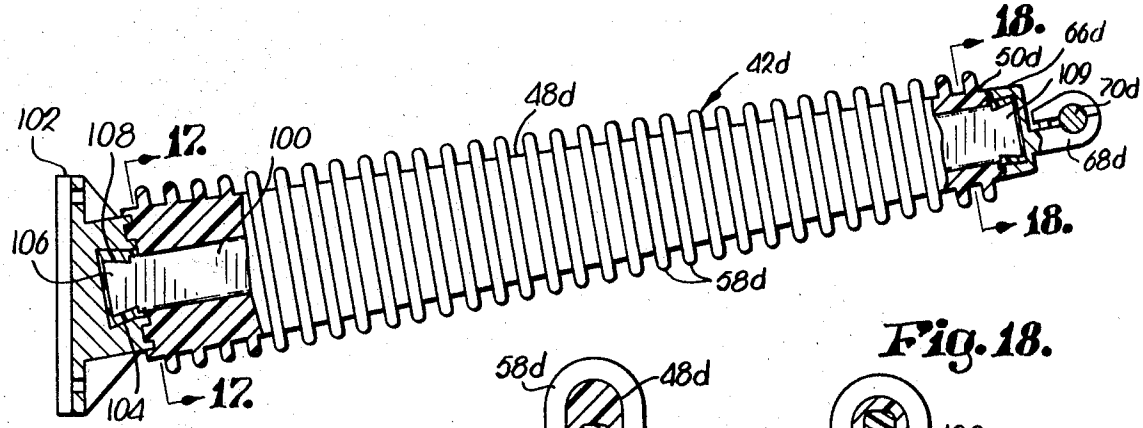




Fig.16.

Fig.17.

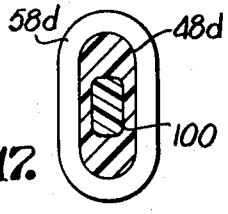



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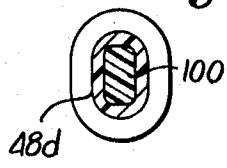
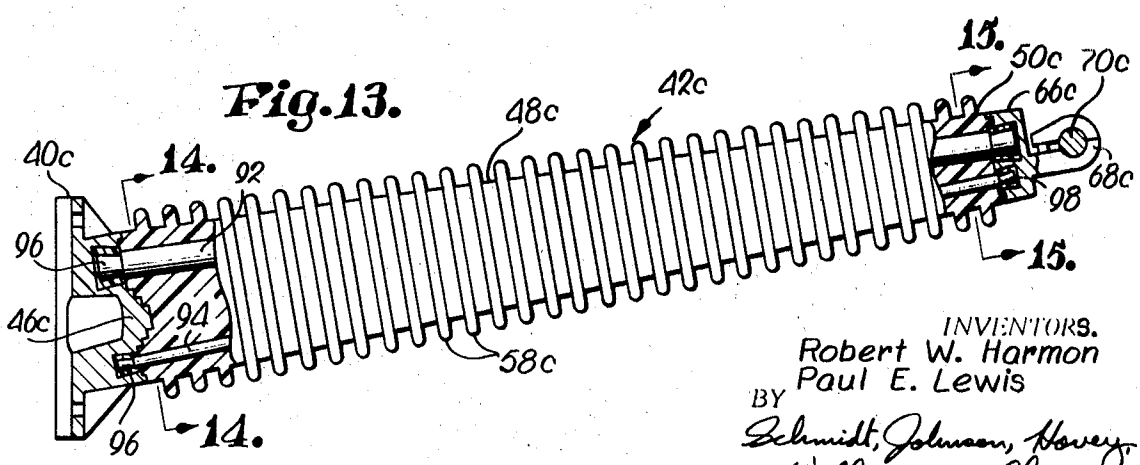



Fig.13.




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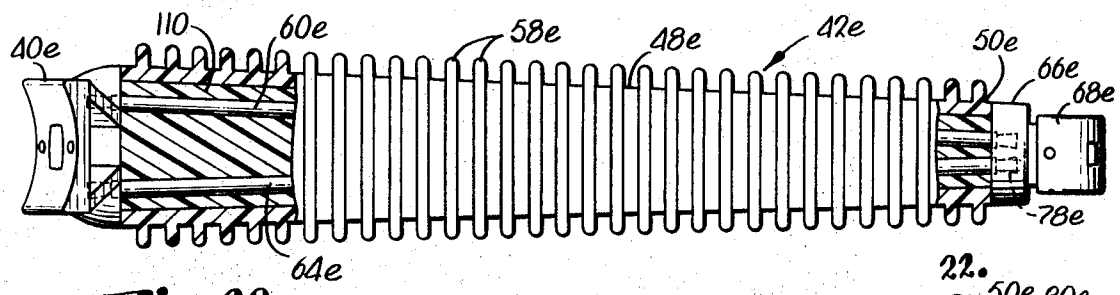



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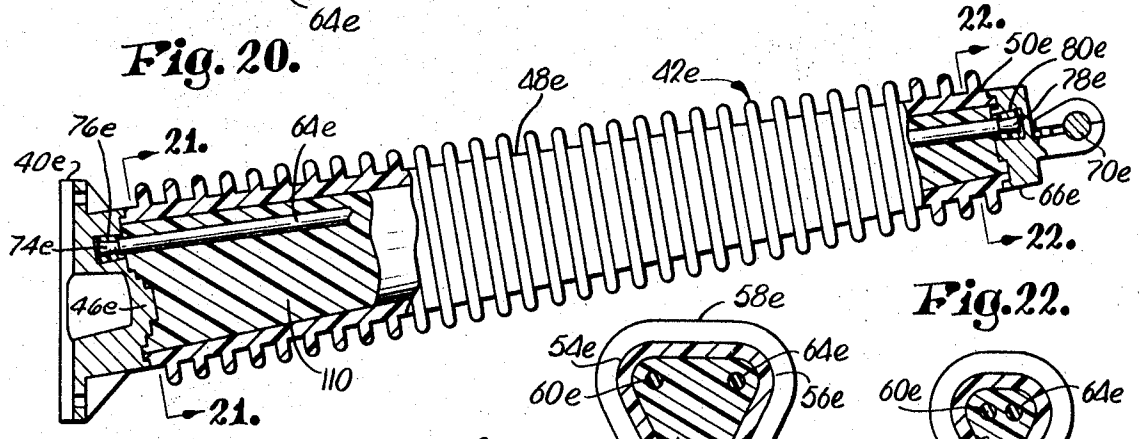
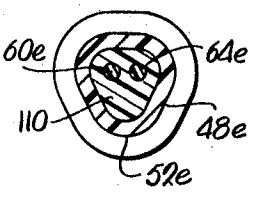



Fig. 19.

Fig. 22.




Fig. 21.



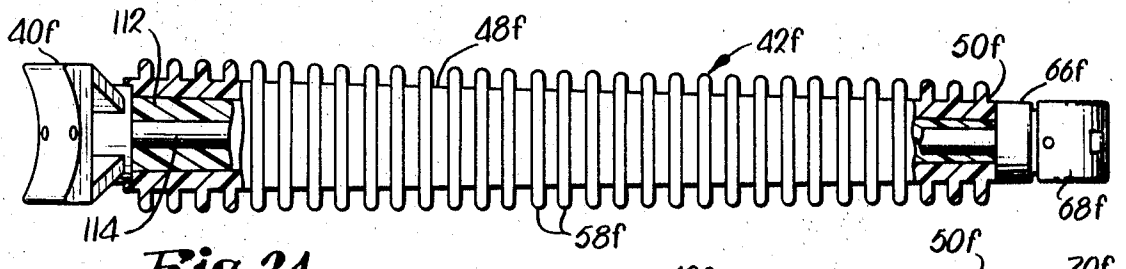




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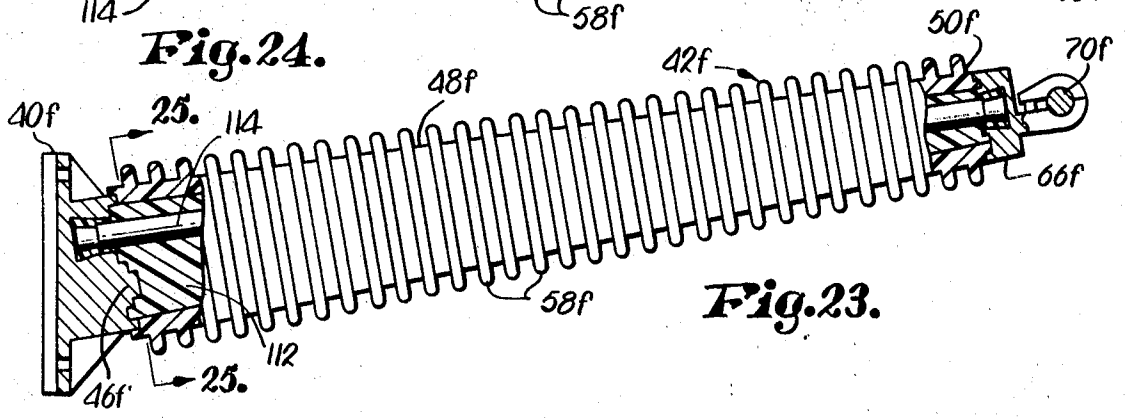



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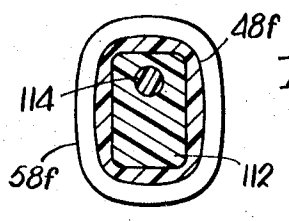



Fig. 25.

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Fig.26.

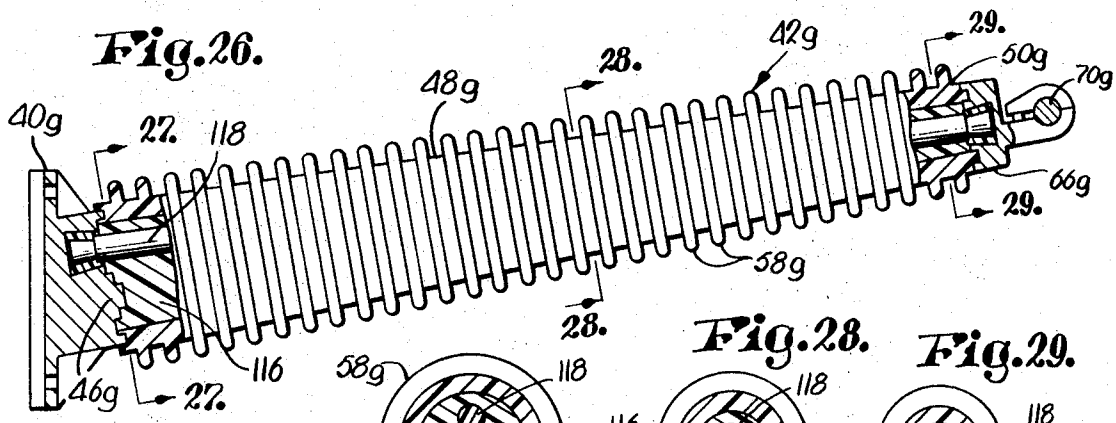



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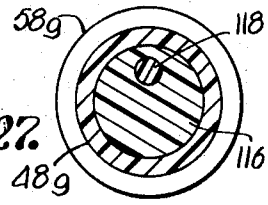



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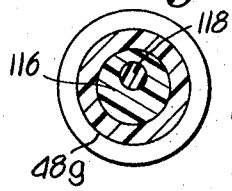



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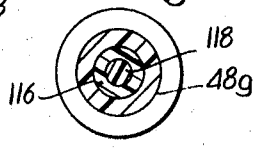



Fig.30.

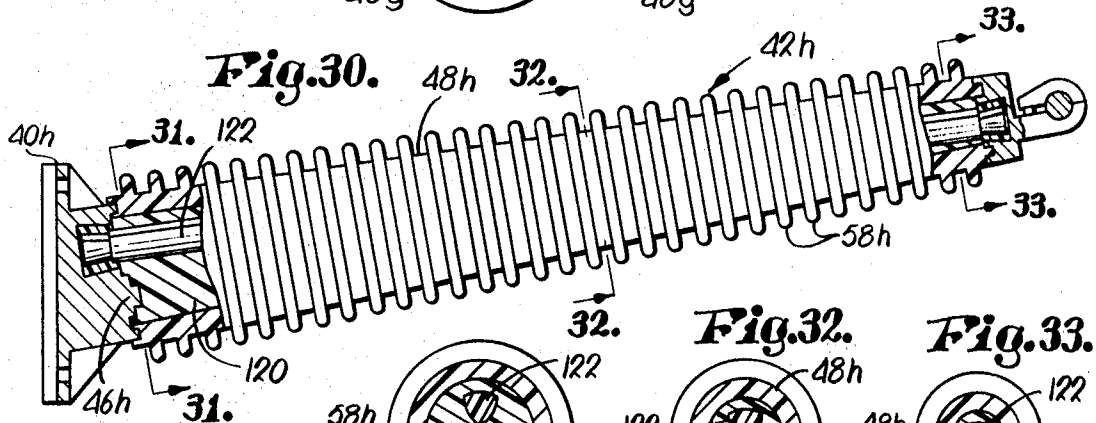



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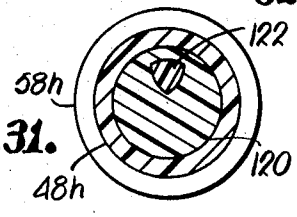



Fig.32.

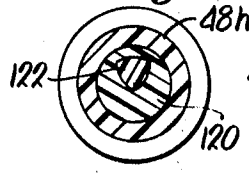



Fig.33.

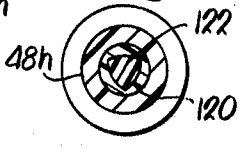



Fig.34.

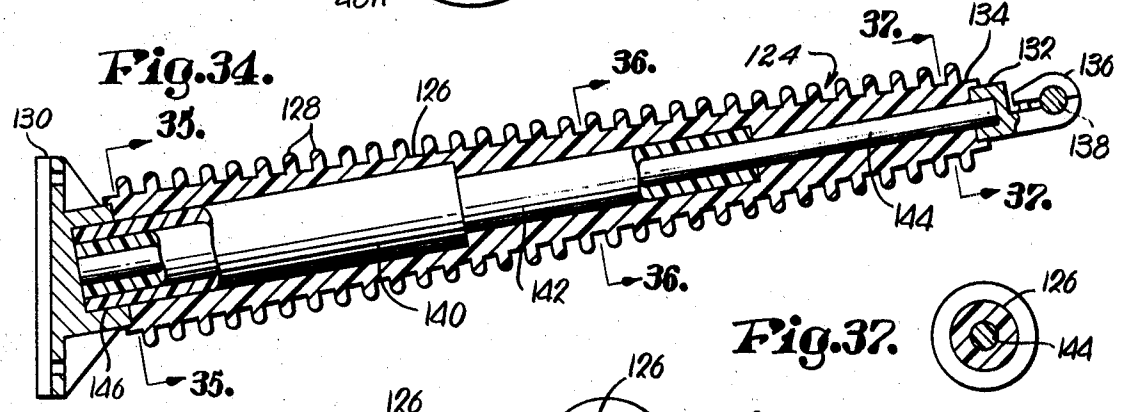



Fig.35.

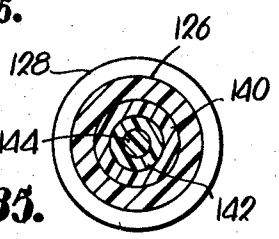



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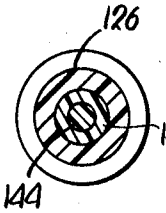



Fig.37.




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# INSULATED CANTILEVER STANDOFF CONDUCTOR SUPPORT

This invention relates to improvements in cantilever standoffs designed to impart an uncluttered appearance to overhead power transmission lines.

Cantilever standoffs are enjoying increased use in the insulation systems of overhead distribution and subtransmission lines as a replacement for wooden crossarm construction, both to provide a more aesthetically pleasing transmission installation and to upgrade the voltage capability of existing structures. Epoxy resins are particularly useful as the material for the standoff arms due to the aesthetic considerations, strength, durability, and superior electrical qualities. However, such resins are appreciably weaker in tension than in compression, thus placing certain limitations on the loads that may be supported. Further more, even greater insulation and resistance to flashover are desired in present day transmission systems, yet without an attendant increase in the cost of the line-supporting structures.

It is, therefore, an important object of the present invention to provide a cantilever standoff of aesthetically pleasing design which is strong in tension as well as in compression.

Another important object of the invention is to provide a cantilever standoff having insulating properties and resistance to flashover superior to prior standoffs of synthetic resin construction or wooden crossarms.

Still another important object of the invention is to provide a standoff of superior electrical qualities as aforesaid which is capable of supporting a current-carrying conductor closer to the line pole than prior standoff constructions.

Yet another important object is to provide a standoff as in the above objects which lends itself to ease of manufacture and costs no more than prior standoffs of synthetic resin construction.

Furthermore, it is a specific aim of this invention to provide a cantilever standoff which is durable, resistant to various stresses, and which advantageously employs any of a number of arrangements utilizing one or more rods within an arm body located to increase the tensile strength thereof and, in some arrangements, augment the compressive strength of the body.

In the drawings:

FIG. 1 is an elevational view of the first embodiment of the standoff of the present invention, the end portions thereof being shown in cross section and parts being broken away to reveal details of construction;

FIG. 2 is a top plan view of the standoff of FIG. 1, certain portions thereof being shown in cross section to reveal the interior construction;

FIGS. 3, 4, and 5 are cross-sectional views taken along lines 3–3, 4–4, and 5–5 respectively of FIG. 1;

FIG. 6 is an elevational view of a modified form of the first embodiment, end portions of the standoff being shown in cross section to reveal details of construction;

FIG. 7 is a top plan view of the standoff of FIG. 6, the end portions being shown in cross section;

FIGS. 8 and 9 are cross-sectional views taken along lines 8–8 and 9–9 respectively of FIG. 6;

FIG. 10 is an elevational view of another modified form of the first embodiment, the end portions of the standoff being shown in cross section to reveal interior construction;

FIGS. 11 and 12 are cross-sectional views taken along lines 11–11 and 12–12 respectively of FIG. 10;

FIG. 13 is an elevational view of another modified form of the first embodiment, similar to FIG. 10;

FIGS. 14 and 15 are cross-sectional views taken along lines 14–14 and 15–15 respectively of FIG. 13;

FIG. 16 is an elevational view showing a further modification of the first embodiment of the present invention, the end portions of the standoff being revealed in cross section as in previous figures;

FIGS. 17 and 18 are cross-sectional views taken along lines 17–17 and 18–18 respectively of FIG. 16;



FIG. 19 is an elevational view of a second embodiment of the invention, portions thereof being illustrated in cross section and broken away to reveal details of construction;

FIG. 20 is a top plan view of the standoff of FIG. 19 with end portions thereof shown in cross section;

FIGS. 21 and 22 are cross-sectional views taken along lines 21–21 and 22–22 respectively of FIG. 19;

FIG. 23 is an elevational view of a modified form of the second embodiment, end portions being illustrated in cross section as in previous figures;

FIG. 24 is a top plan view of the standoff of FIG. 23, end portions being shown in cross section and broken away;

FIG. 25 is a cross-sectional view taken along lines 25–25 of FIG. 23;

FIG. 26 is an elevational view of another modified form of the second embodiment, end portions of the standoff being shown in cross section;

FIGS. 27, 28, and 29 are cross-sectional views taken along lines 27–27, 28–28, and 29–29 respectively of FIG. 26;

FIG. 30 is an elevational view illustrating a further modification of the second embodiment of the invention, end portions of the standoff being shown in cross section as above;

FIGS. 31, 32, and 33 are cross-sectional views taken along lines 31–31, 32–32, and 33–33 respectively of FIG. 30;

FIG. 34 is a longitudinal cross-sectional view in a vertical plane through a third embodiment of the invention, certain portions of the nested rod components being shown in elevation for clarity; and

FIGS. 35, 36, and 37 are cross-sectional views taken along lines 35–35, 36–36, and 37–37 respectively of FIG. 34.

Referring initially to FIGS. 1—5, the standoff there illustrated has a base member 40 from which an elongated standoff arm 42 extends at approximately a 10° angle to the horizontal. The base member 40 is adapted to be attached to a line pole (not shown), openings 44 in the base flange of the member 40 being provided for bolts or other suitable fasteners. An integral portion 46 projects outwardly from the base member 40 and longitudinally into the tapered insulating body 48 of the arm 42.

As FIGS. 3—5 clearly reveal, the tapered body 48 of arm 42 is of progressively greater transverse cross-sectional area from the free, outboard end 50 of the arm 42 to the base member 40. The cross-sectional configuration is generally triangular and the body 48 is oriented such that the apex 52 formed by its two smaller sides is located centrally with respect to the side apexes 54 and 56 and presents the bottom of the body 48. A series of continuous, integral skirts 58 flare outwardly from the body 48 and are longitudinally spaced along the length thereof to increase the flashover resistance of the arm 42.

Three rods, 60, 62, and 64 of uniform circular cross section are disposed within the body 48 and extend longitudinally thereof, the opposed extremities of the rods 60—64 being anchored in the base member 40 and a solid end fitting 66 at the outboard end 50 integral with the lower jaw of a conductor clamp 68. A conductor 70 is illustrated held between the jaws of the clamp 68, and hence in spaced relationship to the line pole (not shown). The two rods 60 and 64 are at the sides of the body 48 adjacent the apexes 54 and 56 respectively, and the rod 62 is centrally disposed in the top portion of the body 48 and lies in a common vertical plane with another rod 72 adjacent the bottom apex 52. It may be appreciated in FIGS. 3—5 that the rods 62 and 72 are respectively spaced above and below the longitudinal centerline of the body 48.

In a cantilever standoff the greatest tensile forces are in a longitudinal region at the top of the body 48 and, accordingly, the greatest compressive load is in a longitudinal region at the bottom thereof. The body 48 is composed of a rigid thermosetting synthetic resin, preferably an epoxy resin of a type suitable for electrical applications where resistance to weathering and tracking is an important consideration. Epoxy resins are appreciably stronger in compression than in tension, thus the three rods 60, 62, and 64 are located adjacent the top of the body 48 in the longitudinal region thereof subject to the

greatest tensile load. The remaining rod **72** augments the compressive loadlbearing qualities of the body **48**, all of the rods being of the same cross-sectional area. Therefore, the total cross-sectional rod area in the tensile load region is three times the rod area in the compressive load region as in clear from the geometry of the arrangement.

In order to secure the extremities **74** of the rods **60—64** and **72** to the base member **40**, the latter has frustoconical anchoring wells **76** therein into which such extremities **74** project. It should be noted that each of the extremities **74** is of a dovetail configuration (frustoconical) and that an epoxy cement surrounds the extremity **74** within the anchoring well **76** to securely join each of the rods to the base member **40**. Similarly, the opposite extremities **78** of the rods **60—64** and **72** likewise project into anchoring wells **80** in end fitting **66** and are cemented in place. The rods are preferably composed of a glass fiber reinforced epoxy synthetic resin, the fibers in each rod being oriented to extend longitudinally thereof.

The projecting portion **46** of the base member **40** is stepped to present a plurality of ledges **82** in the form of radially outwardly facing, concentric annular surfaces as best seen in FIG. **1**. The axis of the concentric surfaces is common with the longitudinal centerline of the body **48**. The ledges **82** defined by these surfaces provide transmittal of shear stresses as will be discussed hereinafter and also provide a good surface area for bonding of the body **48** to the base member **40**.

Referring to FIGS. **6—9**, a modified form of the standoff discussed above is shown, like or similar components being denoted by the same reference numerals with the addition of the "*a*" notation. The construction of the standoff arm **42***a* is the same as the standoff arm **42** of FIGS. **1—5** except for a modification in the shape of the tapered body **48***a* and the use of only two rods, **60***a* and **64***a*. It may be clearly seen in FIGS. **8** and **9** that the top of the body **48***a* presents a straight upper surface between the rounded lateral apexes **54***a* and **56***a*, in contrast to the arcuate, convex surface presented by the top of the body **48**. Therefore, except for the rounded apexes **52***a*–**56**, the cross-sectional configuration of the body **48***a* is essentially an equilateral triangle. In both the forms of FIGS. **1—5** and FIGS. **6—9**, the major mass of the body **48** or **48***a* is above the longitudinal centerline thereof, but in the modified form of FIGS. **6—9** the two tensile load-bearing rods **60***a* and **64***a* replace the three rods **60—64**. A rod in the compressive load region of the body **48***a* is not utilized, the body material itself being relied upon to provide the necessary compressive strength for the standoff arm **42***a*.

A study of FIGS. **3—5** and FIGS. **8** and **9** reveals that in both forms the compressive load-bearing rods are tightly clustered adjacent the outboard end **50** or **50***a* of the standoff arm **42** or **42***a*. The inward spacing of the rods **60** and **64** or **60***a* and **64***a* with respect to the adjacent body apexes remains essentially constant throughout, thus the rods are spread from the tight cluster to a widely spaced separation at the base member **40** or **40***a* to provide a tapered section modulus proportional to the length of the lever arm.

With reference to FIGS. **10—12**, components identical or similar in function to those previously described are denoted by the same reference numerals with the addition of the "*b*" notation. In this modified form the body **48***b* is vertically elongated as is evident from FIG. **11**. Except for rounded upper and lower surfaces, the cross-sectional configuration of the body **48***b* is rectangular and two rods **84** and **86** are disposed therein in closely spaced relationship to the upper and lower body surfaces respectively. The rod **84** is subject to the tensile forces in the body **48***b* and the rod **86** is subject to the compressive load, the two rods **84** and **86** diverging from each other as the base member **40***b* is approached as is clear in the illustrations. Thus, the rods **84** and **86** spread from a tight cluster at the outboard end **50***b* of the arm **42***b* in a manner analogous to the forms previously described. Dovetail extremities **88** of the rods **84** and **86** are anchored in the base member **40***b* in the same manner as described hereinabove, and the opposite dovetail extremities **90** are likewise anchored in the end fitting **66***b*.

The body **48***c* of the modified form shown in FIGS. **13—15** is similar to the body **48***b* of the previous form in that the body **48***c* is vertically elongated as is clear in the cross-sectional views of FIGS. **14** and **15**. However, the sides of the body **48***c* converge toward the bottom of the body in order to provide the greatest horizontal width adjacent the top of the body and a minimum horizontal width adjacent the bottom thereof. This configuration accommodates a pair of rods **92** and **94**, the upper, tensile load-bearing rod **92** being of significantly greater diameter than the lower rod **94** that is subjected to the compressive load. Accordingly, greater rod area is provided in the longitudinal region of the body **48***c* subject to the greatest tensile load, yet only the single rod **92** is utilized in contrast to the multiple rod approach shown in FIGS. **1—5**. Anchoring of the opposed dovetail extremities **96** and **98** of the rods **92** and **94** in the base member **40***c* and the fitting **66***c* is accomplished in the same manner as discussed above for the previously described forms of the invention.

Referring to FIGS. **16—18**, the body **48***d* of the standoff arm **42***d* of this modification has the same cross-sectional configuration as the body **48***b* illustrated in FIGS. **10—12**. However, a single rod **100** is utilized and is longitudinally coaxial with the body **48***d*. The rod **100** is of essentially rectangular cross-sectional configuration with vertical elongation. As is best seen in the cross-sectional view of FIG. **17**, the body **48***d* is also vertically elongated, this being particularly pronounced as the base member **102** of the standoff is approached. The central location of the rod **100** within the body **48***d* provides this modification of the standoff with greater resistance to the moment resulting from the weight of the conductor **70***d*. With its vertical elongation and relatively large cross-sectional area within the body **48***d*, the rod **100** is also effective as a tensile load-bearing member although it is longitudinally centered within the body **48***d*.

The base member **102** of the modification of FIGS. **16—18** differs in construction from the base members of previous forms, primarily in that the stepped central projection is not employed due to the provision of a large, centrally disposed frustoconical anchoring well **104** into which the dovetail extremity **106** projects and is held by an epoxy cement **108**. The opposite extremity **109** of the rod **100** is anchored within the outboard end fitting **66***d* within an appropriately sized well in the same manner as in previous forms of the invention.

The second embodiment of the invention shown in FIGS. **19—22** has a standoff arm **42***e* extending from a base member **40***e* as in the first embodiment. However, the body **48***e* of the arm **42***e* is in the form of an outer, homogeneous jacket surrounding a core **110**, the latter being preferably composed of an epoxy synthetic resin reinforced with random disposed glass fibers. The addition of the reinforced core **110** provides the arm **42***e* with increased compressive strength and also serves to resist horizontal section shear forces. Furthermore, the reinforced core **110** ties together the slender rods of multiple tensile load-bearing rod configurations so that compressive buckling is avoided. The surrounding body jacket **48***e* is preferably an epoxy suitable for use in electrical applications where superior weathering and tracking resistance is requisite, as in the previous embodiment where no core is utilized.

The cross-sectional configuration of the standoff arm **42***e* is identical to the configuration of the arm **42***a* of FIGS. **6—9**, with the addition of the core **110**. A pair of tensile load-bearing rods **60***e* and **64***e* in the core **110** are located as discussed above with respect to the rods in arm **42***a*, somewhat greater inward spacing being utilized in arm **42***e* due to the presence of the outer layer provided by the body jacket **48***e*. This also requires that the stepped portion **46***e* of the base member **40***e* be centered somewhat below the central longitudinal axis of the arm **42***e* to clear the rods **60***e* and **64***e*.

Referring to FIGS. **23—25**, a modified form of the second embodiment features a standoff arm **42***f* having a vertically elongated body **48***f* in the form of a jacket surrounding a rectangular core **112**. The degree of elongation of both the core **112** and the body jacket **48***f* becomes increasingly pronounced as the base member **40***f* is approached. A tensile

load-bearing rod **114** is located above the longitudinal centerline of the arm **42***f* and in the region of greatest tensile load. As in the configuration of FIGS. **19—22**, the core **112** with its reinforced composition serves to strengthen the arm **42***f* in compression.

Referring to FIGS. **26—29**, the modification there illustrated utilizes a standoff arm **42***g* having a tapered body **48***g* of circular cross-sectional configuration, the body **48***g* being in the form of a sleeve surrounding a tapered, cylindrical core **116**. A circular rod **118** is substantially concentric with the core **116** at the outboard end **50***g* of the arm **42***g*, but is uniformly spaced from the top of the core **116** throughout the length of the latter as is clear in the figures. Therefore, the rod **118** is located in the longitudinal region of the arm **42***g* subject to the greatest tensile load.

Similarly, the modification of FIGS. **30—33** employs a standoff arm **42***h* having a body **48***h* in the form of a circular sleeve surrounding a tapered, transversely circular core **120**. A rod **122** is located in the core **120** in much the same manner as described above for the rod **118** within core **116**, but the rod **122** is of asymmetric transverse cross-sectional configuration to concentrate its mass at the greatest distance above the common longitudinal centerline of the core **120** and surrounding body jacket **48***h*. To this end, it may be seen that the rod **122** is of generally triangular configuration with its bottom being presented by one apex, thereby providing the desired mass concentration which becomes increasingly pronounced toward the base member **40***h*, as may be appreciated by a comparison of FIGS. **31** and **32**. Note in FIG. **31** that the rod **122** is entirely above the longitudinal centerline of the core **120**, while at approximately midway along the arm **42***h* the bottom apex of the rod **122** is approximately at such centerline. This same portrayal of the apparent rise of the rod **122** within the core **120** toward the base member **40***h* appears with respect to rod **118** in FIGS. **27** and **28**.

A third embodiment of the invention is illustrated in FIGS. **34—37**. A standoff arm **124** of transversely circular, longitudinally tapered configuration has a body **126** provided with a series of radially outwardly projecting, longitudinally spaced, integral skirts **128**. The larger diameter end of the body **126** is supported by a base member **130** adapted for attachment to a line pole (not shown) or the like. A fitting **132** is secured to the outboard end **134** of the arm **124** and is integrally formed with the lower jaw of a conductor clamp **136** which receives and supports a conductor **138** therein.

The body **126** is of synthetic resin material as in the previous embodiments and contains three relatively telescoped, nested rod components **140**, **142**, and **144**. The inner, nested ends of the rod components **140—144** are received within a cylindrical bore **146** in the base member **130**, it being appreciated that the short length of the outer rod component **140** and the intermediate length of the component **142** present longitudinal rod sections of successively reduced diameter toward the outboard end **134**. The figures clearly show, however, that the rod components occupy a substantial portion of the available cross-sectional area of the arm **124**, thereby providing a major load-bearing member for both tensile and compressive forces in the arm **124**. As in previous embodiments, the rod components **140—144** are preferably composed of an epoxy synthetic resin reinforced with longitudinally oriented glass fibers.

In conclusion, it should be appreciated that the transverse cross-sectional area of the rods utilized in the present invention is constant in all of the constructions illustrated, thus permitting the use of cylindrical elements in a majority of the forms of the invention. In the multiple rod forms, the rods are spread toward the base to provide an increase in the moment of inertia toward the base in order to resist the higher load moment.

At the base member and the outboard end fitting, the rods of multiple rod configurations are individually anchored, the same anchor geometry being utilized for both the tensile and the compressive load-bearing rods. The anchoring arrangement is particularly advantageous in resisting tensile forces, thus it provides good durability against a stress reversal in compressive load-bearing rods such as produced by static uplift loads, installation abuse, or mechanical transients. One embodiment of the invention employs a reinforced body core for improved compression and shear strength, thereby reducing the need for rods in the lower half of the cross section and improving the strength of the tie between rods in multiple rod configurations.

With respect to the base members, the concentric, stepped configuration of the body-engaging projecting portion provides ledges for transmittal of shear stresses independently of the rods. This avoids a reduction in the tensile strength of the rods that would occur if shear forces were exerted across the rods at their zones of entrance into the anchoring wells in the base member.

Having thus described the invention, what we claim as new and desire to be secured by Letters Patent is:

**1**. A cantilever conductor standoff structure comprising:
- a base member adapted for attachment to an upright support;
- an elongated standoff arm extending from said member and presenting a free, outboard end remote from said member,
- said arm having a tapered, insulating body of progressively greater transverse cross-sectional area as said member is approached, and a plurality of spaced apart, tensile load-bearing rods in said body extending longitudinally thereof from said member to said outboard end;
- a conductor support carried by said outboard end; and
- means rigidly connecting opposed extremities of said rods to said member and said member and said conductor support,
- at least a major portion of each of said rods being disposed above the longitudinal centerline of said body in a longitudinally extending region thereof subject to the greatest tensile load,
- said body having a generally triangular transverse cross-sectional configuration with one apex thereof presenting the bottom of said body and the side between the other two, lateral apexes presenting the top thereof,
- said rods being spaced transversely of said body adjacent said top.

**2**. The structure as claimed in claim **1**, said body being composed of a rigid thermosetting synthetic resin.

**3**. The structure as claimed in claim **2**, said rods being composed of a glass fiber reinforced, rigid thermosetting synthetic resin.

**4**. The structure as claimed in claim **3**, said resin being epoxy.

**5**. The structure as claimed in claim **2**, said body having a glass fiber reinforced core within which said rods are disposed, and an outer, homogenous jacket resistant to weathering and tracking.

**6**. The structure as claimed in claim **5**, the fibers in said core being random disposed, said rods being composed of a glass fiber reinforced, rigid thermosetting synthetic resin having longitudinal fiber orientation.

**7**. The structure as claimed in claim **2**, said body being provided with a series of integral, outwardly projecting skirts spaced longitudinally thereof.

**8**. The structure as claimed in claim **1**,
- there being a compressive load-bearing rod element in said body adjacent said bottom apex and extending longitudinally of the body from said base member to said outboard end; and
- means rigidly connecting opposed extremities of said element to said member and said conductor support.

**9**. A cantilever conductor standoff structure comprising:
- a base member adapted for attachment to an upright support;
- an elongated standoff arm extending from said member and presenting a free, outboard end remote from said member,

said arm having a tapered, insulating body of progressively greater transverse cross-sectional area as said member is approached, and a tensile load-bearing rod in said body extending longitudinally thereof from said member to said outboard end;
a conductor support carried by said outboard end; and
means rigidly connecting opposed extremities of said rod to said member and said conductor support,
said base member having a portion projecting longitudinally into said body in engagement with the latter and configured for transmittal of shear stresses to said member,
said projecting portion of the base member being stepped to present a plurality of ledges against which the shear forces bear.

**10**. A cantilever conductor standoff structure comprising:
a base member adapted for attachment to an upright support;
an elongated standoff arm extending from said member and presenting a free, outboard end remote from said member,
said arm having a tapered, insulating body of progressively greater transverse cross-sectional area as said member is approached, and a tensile load-bearing rod in said body extending longitudinally thereof from said member to said outboard end;
a conductor support carried by said outboard end; and
means rigidly connecting oppose extremities of said rod to said member and said conductor support,
said base member and said conductor support having anchoring wells therein receiving said extremities of the rod,
said connecting means including said wells and a cement therein bonding said extremities to said member and said conductor support,
each of said extremities having a dovetail configuration within the corresponding well.

**11**. A cantilever conductor standoff structure comprising:
a base member adapted for attachment to an upright support;
an elongated standoff arm extending from said member and presenting a free, outboard end remote from said member,
said arm having a tapered, insulating body of progressively greater transverse cross-sectional area as said member is approached, and a tensile load-bearing rod in said body extending longitudinally thereof from said member to said outboard end;
a conductor support carried by said outboard end;
means rigidly connecting opposed extremities of said rod to said member and said conductor support,
at least a major portion of said rod being disposed above the longitudinal centerline of said body in a longitudinally extending region thereof subject to the greatest tensile load;
a compressive load-bearing rod element in said body extending longitudinally thereof from said base member to said outboard end; and
means rigidly connecting opposed extremities of said element to said member and said conductor support,
at least a major portion of said element being disposed below the longitudinal centerline of said body.

**12**. The structure as claimed in claim **11**,
there being a plurality of said tensile load-bearing rods in said body spaced apart in said region and having a greater total transverse cross-sectional area than said element,
the first-mentioned connecting means joining opposed extremities of said plurality of rods to said base member and said conductor support.

**13**. The structure as claimed in claim **12**,
said body having a generally triangular transverse cross-sectional configuration with one apex thereof presenting the bottom of said body and the side between the other two, lateral apexes presenting the top thereof,
said tensile load-bearing rods being three in number spaced transversely of said body adjacent said top with the middle rod centrally disposed with respect to said lateral apexes,
said element being disposed adjacent said bottom apex.

**14**. The structure as claimed in claim **11**, said tensile load-bearing rod having a greater transverse cross-sectional area than said element.

**15**. The structure as claimed in claim **14**, said body having a vertically elongated transverse cross-sectional configuration and a greater horizontal width adjacent said tensile load-bearing rod.

**16**. The structure as claimed in claim **11**, said body having a vertically elongated transverse cross-sectional configuration.

**17**. A cantilever conductor standoff structure comprising:
a base member adapted for attachment to an upright support;
an elongated standoff arm extending from said member and presenting a free, outboard end remote from said member,
said arm having a tapered, insulating body of progressively greater transverse cross-sectional area as said member is approached, and a tensile load-bearing rod in said body extending longitudinally thereof from said member to said outboard end;
a conductor support carried by said outboard end; and
means rigidly connecting opposed extremities of said rod to said member and said conductor support,
at least a major portion of said rod being disposed above the longitudinal centerline of said body in a longitudinally extending region thereof subject to the greatest tensile load,
said rod having an asymmetric transverse cross-sectional configuration to concentrate its mass at the greatest vertical distance from said centerline.

**18**. A cantilever conductor standoff structure comprising:
a base member adapted for attachment to an upright support;
an elongated standoff arm extending from said member and presenting a free, outboard end remote from said member,
said arm having a tapered, insulating body of progressively greater transverse cross-sectional area as said member is approached, and a tensile load-bearing rod in said body extending longitudinally thereof from said member to said outboard end;
a conductor support carried by said outboard end; and
means rigidly connecting opposed extremities of said rod to said member and said conductor support,
at least a major portion of said rod being disposed above the longitudinal centerline of said body in a longitudinally extending region thereof subject to the greatest tensile load,
said body having a circular transverse cross-sectional configuration of progressively greater diameter as said base member is approached.

**19**. The structure as claimed in claim **18**, said rod having an asymmetric transverse cross-sectional configuration to concentrate its mass at the greatest vertical distance from said centerline.

**20**. A cantilever conductor standoff structure comprising:
a base member adapted for attachment to an upright support;
an elongated standoff arm extending from said member and presenting a free, outboard end remote from said member,
said arm having a tapered, insulating body of progressively greater transverse cross-sectional area as said member is approached, and a tensile load-bearing rod in said body extending longitudinally thereof from said member to said outboard end;
a conductor support carried by said outboard end; and
means rigidly connecting opposed extremities of said rod to said member and said conductor support,
at least a major portion of said rod being disposed above the longitudinal centerline of said body in a longitudinally extending region thereof subject to the greatest tensile load,

said body and said rod having vertically elongated transverse crosslsectional configurations.

21. A cantilever conductor standoff structure comprising:

a base member adapted for attachment to an upright support;

an elongated standoff arm extending from said member and presenting a free, outboard end remote from said member,

said arm having a tapered, insulating body of progressively greater transverse cross-sectional area as said member is approached, and a tensile load-bearing rod in said body extending longitudinally thereof from said member to said outboard end;

a conductor support carried by said outboard end; and

means rigidly connecting opposed extremities of said rod to said member and said conductor support,

at least a major portion of said rod being disposed above the longitudinal centerline of said body in a longitudinally extending region thereof subject to the greatest tensile load,

said rod having a stepped configuration presenting a plurality of longitudinal sections of successively reduced transverse cross-sectional area toward said outboard end.

22. The structure as claimed in claim 21, said body and said rod being of generally circular cross-sectional configuration and substantially coaxially disposed.

23. The structure as claimed in claim 21, said rod including a plurality of elongated, relatively telescoped, nested components presenting said sections.