Oct. 1, 1929. N. A. WAHLBERG 1,730,102

INSULATOR

Filed April 11, 1927

Fig. 1

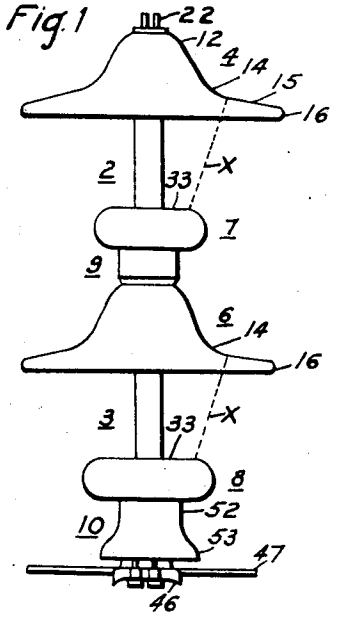


Fig. 2

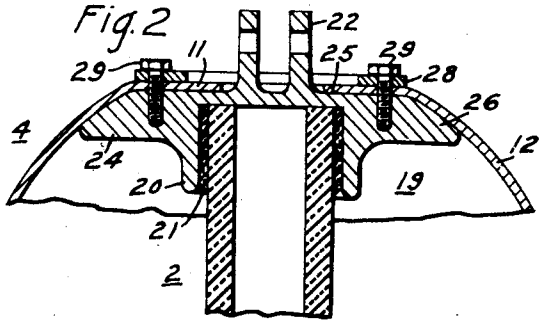


Fig. 3

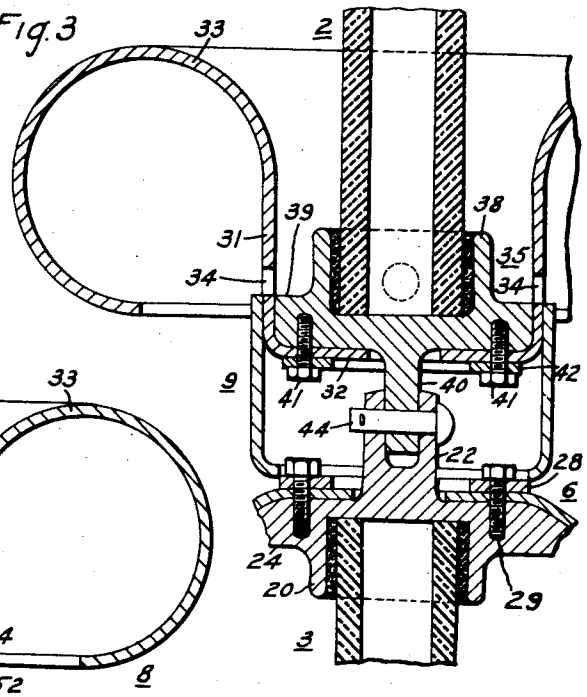
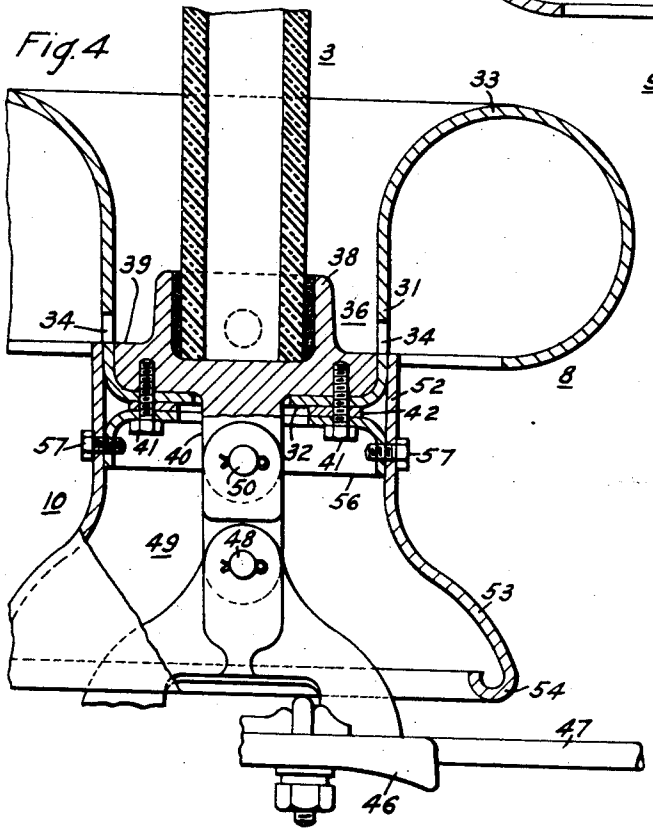


Fig. 4



INVENTOR

Nils A. Wahlberg

BY

Chester L. Barr

ATTORNEY

Patented Oct. 1, 1929

1,730,102

UNITED STATES PATENT OFFICE

NILS A. WAHLBERG, OF WILKINSBURG, PENNSYLVANIA, ASSIGNOR TO WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY, A CORPORATION OF PENNSYLVANIA

INSULATOR

Application filed April 11, 1927. Serial No. 182,556.

My invention relates to insulators and particularly to insulators for supporting high-voltage transmission lines.

One object of my invention is to provide an insulator of the above-indicated character, that shall be thoroughly shielded against the concentration of electrostatic stresses at any position thereon.

Another object of my invention is to provide means for effectively bracing a relatively expansive sheet-metal electrostatic-stress-distributing member of a high-voltage insulator.

Another object of my invention is to provide means for shielding the connecting parts of high-voltage insulators that shall be readily movable to facilitate the manipulation of the connecting parts.

A further object of my invention is to provide an insulator that shall be simple and durable in construction, economical to manufacture and effective in its operation.

In copending application, Serial No. 548,818, filed April 1, 1922 by H. B. Smith and assigned to the Westinghouse Electric & Manufacturing Company, is set forth an insulator of which this invention is an improvement. Reference may be had to the copending application for a better understanding of the device herein set forth.

Broadly, the insulator is adapted to widely distribute, and prevent the concentration, of its field at any position, and to so direct and control the field as to cause it to be of negligible strength along the insulator and also, within the outer perimetral limits of an upper hood therefor.

These features are obtained by the use of very widely curved toroidal conducting surfaces, at the ends of the insulator, which cause the field to be of hollow cylindrical form. In other words, the field of greatest intensity surrounds the insulator, in spaced relation thereto, in the form of a hollow cylinder of less diameter than the toroids.

While the field also, extends parallel to the cylinder, above-mentioned, at both the inside and outside thereof, it is so materially weakened at these positions as to prevent surface-current formation, from corona, on the insulated surface and the disruption of the field from rain water at the outer edge of the upper stress-distributing member or hood.

In such structure, the relatively great expanse of conducting surface required renders the insulator difficult to construct in a compact, strong, durable and economical manner, and other problems, such as adequate holding, and shielding means for the terminals, have been presented.

It is my aim to further the already material advancement of insulators, of the above-mentioned type, by providing a neat, compact and effective structure that thoroughly shields the connecting parts, that facilitates the manipulation thereof, that is easy to manufacture and assemble, that withstands damage from handling and service and that has other features of advantage over suggestions heretofore made.

Accordingly, in practicing my invention, I provide an insulator embodying an upper sheet-metal hood that is so mounted and braced, a lower sheet-metal shield that is so formed and movably mounted, and an intermediate shield that so cooperates between other shields at opposite sides thereof as to obtain a very effective structure.

Figure 1 of the accompanying drawing is a side elevational, or outline, general view of an insulator embodying my invention,

Fig. 2 is an enlarged fragmentary sectional view of the top portion of the device shown in Fig. 1,

Fig. 3 is a view similar to Fig. 2 of an intermediate portion of the structure, and

Fig. 4 is also, a view, similar to Fig. 2, of the bottom end of the device illustrated in the other figures.

The device comprises, in general, insulating members 2 and 3, a top hood 4, an intermediate hood 6, an upper torus 7, a lower torus 8, an intermediate shield 9 and a lower shield 10.

The insulating members 2 and 3 are preferably constructed as tubes or rods of porcelain, glass or any other suitable material and, if of porcelain or glass, may be suitably roughened for portions of the lengths, adjacent to the ends, thereof, as by serrating,

sanding, etching or any other appropriate method.

The hood or electrostatic-stress-distributing members 4 and 6 are preferably constructed of spun or pressed sheet metal, such as copper, brass or aluminum, and have apertured end portions 11, bowl-like portions 12, toroidal portions 14, rim portions 15 and outer perimetral or water-drip edges 16.

An upper terminal member 19, as shown in Fig. 2 comprises a cylindrical cap portion 20 that is secured, as by a body of cement 21, to the end of the rod 2, clevis or other members 22 for mounting the insulator, and an annular outwardly or radially projecting flange 24 having a flat surface 25 against which the flat end portion 11 of the hood 4 rests and a curved surface 25 substantially conforming to a portion of the bowl portion 12 of the hood.

The hood 4 is secured to the flange 24 by a flat sheet-metal ring 28 and screws 29 which extend through the ring 28 and into the flange 24.

The hood 6 is similarly constructed and mounted, as shown at the lower portion of Fig. 3 in which corresponding parts are designated by corresponding reference characters.

The tori or electrostatic-stress-distributing members 7 and 8 are also, constructed of sheet-metal and each comprises a cylindrical cup portion 31 having an apertured end-wall 32, and a widely-rounded or gradually-curved toroidal portion 33 that projects upwardly from the cup portion 31. Drainage openings 34 are provided in the portions 31.

Terminal members 35 and 36 are provided for the lower ends of the rods 2 and 3, respectively, and, similarly to the upper terminal members 19, each comprises a cap portion 38 cemented to the rod, a flange 39 and an eye or similar portion 40.

Similarly to the upper structure, the cup portions 31 are secured to the flanges 35 and 36, by screws 41 and rings 42.

A pin 44 connects the eye and clevis members 40 and 22 at the lower end of the rod 2 and the upper end of the rod 3, respectively.

A clamp 46, of usual and well-known construction, for supporting a conductor 47, is connected, by a pin 48, to a combined eye-and-clevis member 49 which is connected, by a pin 50, to the eye portion of the bottom terminal member 36.

The shield member 9 is of simple, sheet-metal-cylindrical cup construction disposed on the lower ring 28 and adapted for longitudinal upward movement in telescopic relation to the cup portion 31 of the torus 7. This construction prevents concentration of the insulator field on the pin and screw hoods, and other projecting points and edges between the rods 2 and 3, and permits easy access to the connecting parts.

The shield member 10 comprises a cylindrical portion 52 telescopically embracing the lower end of the bottom cup 31 and a downwardly-and-outwardly flaring skirt 53 having a rounded up-turned bottom edge 54 surrounding the clamp 46.

A shallow cup-like member 56 is disposed in bottom-to-bottom relation to the lower cup 31 against the ring 42 to which it is secured, by the screws 41, and has openings registering with openings in the portion 52 for the reception of screws 57.

By removing the screws 57, the member 10 may be raised, similarly to the shield 9, to give access to the pins 48 and 50.

As indicated by a line x, with respect to each of the series-related rods 2 and 3 in Fig. 1, the field of greatest electrostatic intensity occurs between the toroidal portions 14 and 33 in a frusto-conical cylindrical zone surrounding the rods within the edges 16.

By reason of the deep bowl-like character of the portion 12 and the broad area of the rim portion 15, the field decreases in strength, from the line x toward the rod and toward the edge 16 so that, at these positions, it is almost negligible in strength.

Thus, corona formation on the surface of the rod, which sometimes gradually increases in intensity until flashover occurs, is prevented and description of the field by the precipitation of water, from the edge 16 into a strong field, cannot occur under most severe natural conditions.

Since the upper members or hoods 4 and 6 are of relatively thin sheet metal and of relatively great area, they are subject to stress from wind and to damage from other causes but, in view of the flanges 24 and the particular relation thereof to the hoods, they are reinforced and supported over relatively great areas. These features which are new in a device of this character, so far as I am aware, provide great stability to the thin sheet elements, protect them in handling and shipping and constitute improvements, in general, in a device of this class.

Also, as seen in Figs. 2, 3 and 4, while there are several small parts and portions which would ordinarily tend to concentrate the field and cause breakdown thereof, they are so completely shielded by the extension and gradually-curved conducting surfaces of the members 4, 6, 7, 8, 9 and 10, as more generally apparent in Fig. 1, as to be rendered totally incapable of causing such concentration.

The rings 28 provides relatively broad clamping areas over the sheet metal parts and, in contradistinction to the condition which would exist if the small heads of the screws 29 were above employed to hold the thin sheet metal, prevent the ready crimping, cracking or tearing thereof.

While my invention is essentially a refinement of a known structure and I have

shown a particular form thereof, it is important in rendering that structure more practical and useful, and changes may be effected in the invention without departing from the spirit and scope thereof, as set forth in the appended claims.

I claim as my invention:

1. An insulator structure comprising an insulating member having a cylindrical end, a terminal member having a cap portion over said end, a holding portion on the cap and an annular outwardly-projecting flange on the cap having an upper surface substantially flush with the upper surface of the cap, and a sheet-metal hood supported by said flange.

2. An insulator structure comprising an insulating member having a cylindrical end, a terminal member having a cap portion over said end, a holding portion on the cap and an annular outwardly-projecting flange on the cap having an upper surface substantially flush with the upper surface of the cap, a sheet-metal hood supported by said flange, a ring member on the hood, and means for securing the hood between the flange and the ring member.

3. An insulator structure comprising an insulating member having a cylindrical end, a terminal member having a cap portion over said end, a holding portion on the cap and an annular outwardly-projecting flange on the cap having an upper surface substantially flush with the upper surface of the cap and embodying an outwardly-and-downwardly-curved upper surface, and a sheet-metal hood having a curved portion substantially conforming to the curved surface of said flange.

4. An insulator structure comprising an insulating member having a cylindrical end, a terminal member having a cap portion over said end, a holding portion on the cap and an annular outwardly-projecting flange on the cap, embodying a flat outer surface and a curved surface surrounding the flat surface, a sheet-metal hood having portions substantially conforming to said flat and curved surfaces, a flat sheet-metal ring disposed over said flat surface on the hood, and means for securing the hood between the flange and the ring.

5. An insulator structure comprising an insulating member having a lower terminal-end portion, and electrostatic-stress-distributing member having a cylindrical portion around said end and a toroidal portion around the insulator adjacent thereto, and another electrostatic-stress-distributing member having a cylindrical portion telescopically related to said first cylindrical portion.

6. An insulator structure comprising an insulating member, having a lower terminal-end portion, an electrostatic-stress-distributing member having a cylindrical portion around said end and a toroidal portion around the insulator adjacent thereto, and another electrostatic-stress-distributing member having a cylindrical portion longitudinally movable on, and telescoping, said first cylindrical member.

7. An insulator structure comprising an insulating member, having a lower terminal-end portion, an electrostatic-stress-distributing member having a cylindrical portion around said end and a toroidal portion around the insulator adjacent thereto, and another electrostatic-stress-distributing member having a cylindrical portion longitudinally movable on, and telescoping, said first cylindrical member and a downwardly-and-outwardly flaring annular portion.

8. An insulator structure comprising a plurality of series-related elongated insulating members, an electrostatic-stress-distributing member at the lower end of one of said insulating members having a cylindrical central portion and a widely-rounded toroidal portion surrounding the insulator axis, an electrostatic-stress-distributing hood member on the insulating member next below said end, and a metal cylinder extending between said hood and said cylindrical portion.

9. An insulator structure comprising a plurality of series-related elongated insulating members, an electrostatic-stress-distributing sheet-metal member having a cylindrical cup portion and a gradually-curved toroidal portion around the lower end of one of said insulating members, an electrostatic-stress-distributing sheet-metal hood member at the upper end of the insulating member next below said end, and a sheet-metal member having a cylindrical portion telescoping said first cylindrical portion, said second cylindrical member normally resting on said hood but being movable upward therefrom.

10. An insulator structure comprising an insulating member having a lower terminal-end portion, an electrostatic-stress-distributing sheet-metal member having a cup portion covering said end, a second sheet-metal member of substantially cup-shape disposed in bottom-to-bottom relation, and secured to, said first cup, and an electrostatic-stress-distributing member having a cylindrical portion longitudinally-movably telescoping said cups and adapted for attachment to one thereof.

11. An insulator structure comprising an insulating member having a cylindrical end, a terminal member having a cap portion over said end and an annular outwardly-projecting flange on the cap, and a sheet-metal hood mounted on the terminal member and having portions supported by the end of the cap and by said flange.

In testimony whereof, I have hereunto subscribed my name this 8th day of April, 1927.

NILS A. WAHLBERG.