Sept. 18, 1962 G. M. RUOFF 3,054,704

INSULATOR ASSEMBLY METHOD AND APPARATUS

Filed Sept. 22, 1959 2 Sheets-Sheet 1

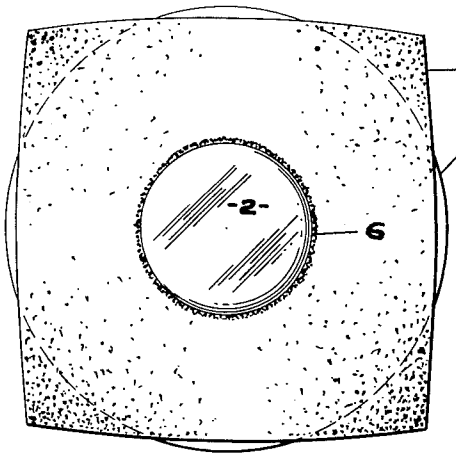



FIG. 5.

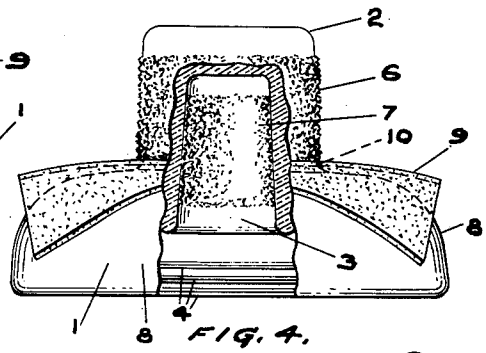



FIG. 4.

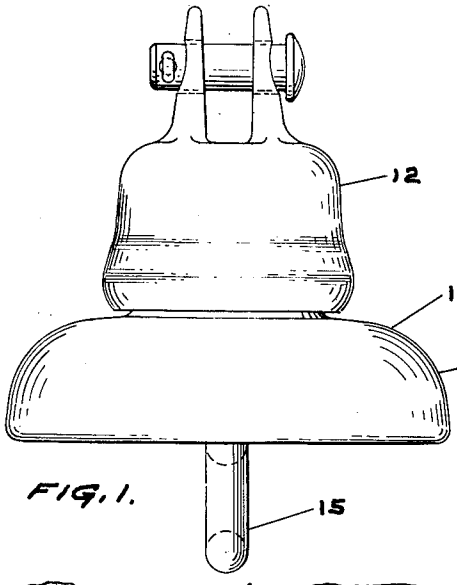



FIG. 1.

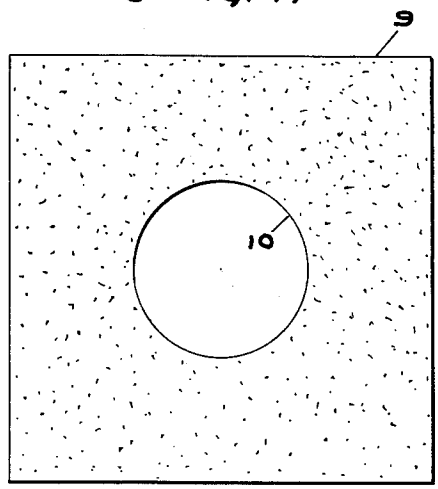



FIG. 2.




FIG. 3.

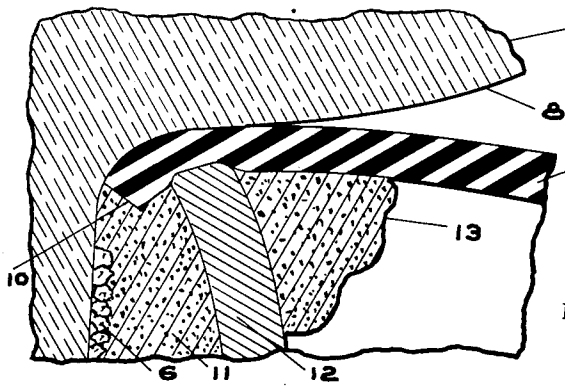



FIG. 7.

INVENTOR

George M. Ruoff

BY Thomas W. Y. Clark

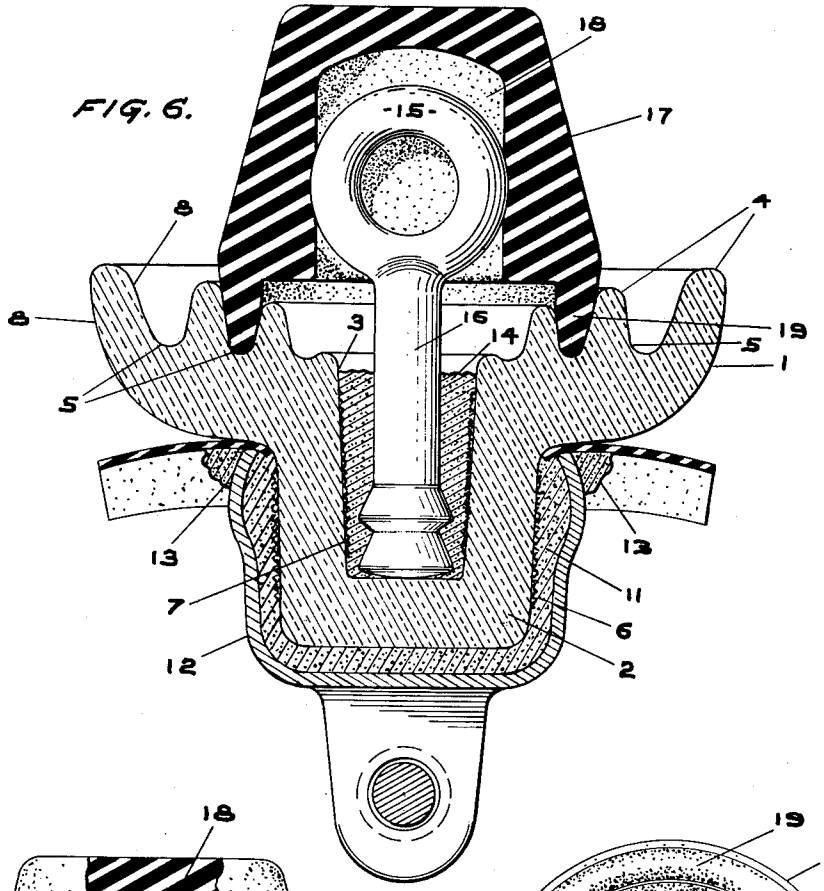
ATTORNEY

Sept. 18, 1962 G. M. RUOFF 3,054,704

INSULATOR ASSEMBLY METHOD AND APPARATUS

Filed Sept. 22, 1959 2 Sheets-Sheet 2

FIG. 6.



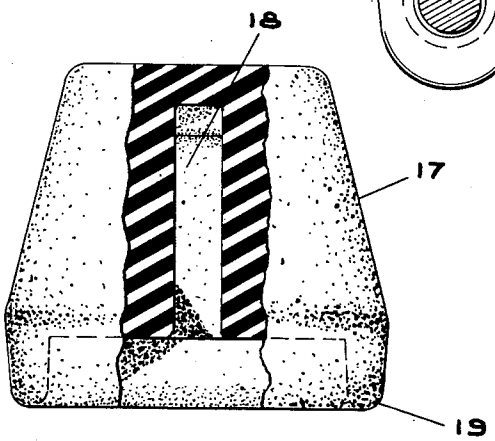




FIG. 8.

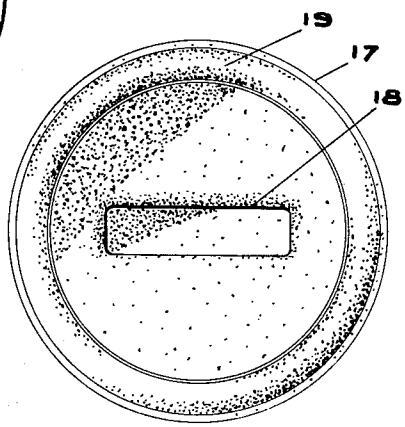



FIG. 9.

INVENTOR

George M. Ruoff

BY Thomas W. J. Clark

ATTORNEY

United States Patent Office 3,054,704 Patented Sept. 18, 1962



3,054,704

# INSULATOR ASSEMBLY METHOD AND APPARATUS

George M. Ruoff, Parkersburg, W. Va., assignor to A. B. Chance Company, Centralia, Mo., a corporation of Missouri

Filed Sept. 22, 1959, Ser. No. 841,632
10 Claims. (Cl. 154—43)

This invention relates to a method and apparatus for assembling electric insulators.

Electric insulators comprise a dielectric or porcelain member and metallic members often referred to as hardware. The invention is illustrated as applied to a suspension insulator having at its dielectric member a circular disk with a projecting head on top and on the bottom a series of concentric ridges or corrugations with an orifice or pinhole opening up into the head from the bottom axially in the disk. A pin is inserted in the orifice and a cap on the head, both of metal and these are strung in a line and on the lowermost disk or its pin is mounted the high tension electric line, the string of disks being supported from cross bars or other supports for the high tension line.

Heretofore, in the assembly of such disks with the hardware it has been the practice to place the dielectric insulator member or disk with the bottom down and place a cardboard collar around the head. The cap then has a quantity of Portland cement placed in it and then it is inverted and placed over the head. The collar prevents contact between the bottom of the cap and the top of the disk and, after allowing the cement to set and removing the collar, the gap or space left between the parts prevents damage to the disk upon atmospheric changes in temperature. The disk as assembled with the cap and before the setting of the cement therein, is inverted and a measured quantity of Portland cement placed in the center orifice or pinhole and then the shank of the pin is inserted into the cement and a split cardboard collar is placed over the pin and within the top of the pinhole to hold the pin in the hole center. The insulator so assembled is then placed in a curing or setting chamber filled with steam or water vapor so that the Portland cement in both the cap and pinhole is allowed to cure.

It has been suggested to place a rubber spacer around the head between the insulator and the cap's lower edge or lip to hold the cement in the cap and then with the insulator in its proper position with the pinhole down and head up, the insulator is vibrated to move the cement down close to the lower lip of the cap and after placing the cement and pin in the pinhole, the cement is steam cured by the usual method.

In either of these methods some cement reaches unwanted places on the cap or the dielectric disk and sometimes even on the pin and after the curing, this misplaced cement has to be removed by wire brushes or otherwise to present a marketable article.

Among the objects of the present invention is to do away with the necessity of this cleaning, to avoid the overflow or spattering of cement on the insulator or its hardware and to avoid the necessity of introducing the insulator into a steam room or otherwise adding moisture to the cement during the hydration process. This is accomplished by the use of a rubber collar between the cap and the insulator, and no vibrating is required, and as soon as the cap is placed on the head of the insulator the assembly is inverted which prevents any further flow of the cement. Even prior to this action, however, the cap is coated on its outside with paraffin or silicone which allows the excess cement to be stripped off easily and quickly and since no heating or steaming is required in the assembly method of this invention the paraffin, or similar



material remains effective as a releasing agent to keep the excess assembly cement from sticking so that it is easily brushed off. After the insulator and cap are inverted, with the pinhole up, a measured quantity of cement is placed within the pinhole, the pin inserted and then a resilient centering cup, preferably made of a plastic material, for example, rubber, and having a center orifice of a suitable size to securely receive the end of the pin extending from the pinhole in the head is placed over the pinhole of the insulator and this cup member has a depending skirt or lip which fits concentrically within one of the grooves or corrugations between the ridges concentric with the pinhole of the inverted lower exposed face of the insulator. This cup fitting tightly and the rubber collar fitting tightly seals the space between the cap and insulator and seals off the loss of all moisture from the cement within the socket of the cap and the pinhole holding the pin and seals in the mix water of the cement. It will be noted that the type seal obtained might be referred to as a "dry seal," since the collar and cup are of impervious, non-absorbent materials that neither take up moisture by sponge or wick-like action from the cement nor require or permit preliminary saturation with moisture to minimize such wick-like action. Thus, the gasket and cup are both, in effect, dry sealing means. The cup member additionally centers the pin. The insulator thus assembled is left standing for the curing period of the cement, the moisture within the cement is generally adequate to promote this curing effectively without the addition of steam or moisture of any kind, although it would be within the scope of the present invention to add a small amount of water to the cement in the pinhole before tightly closing it by the centering cup. The resilient members prevent rapid evaporation of the cement mix water entrapped. Thus no injurious heating or discoloration or corrosion or time consuming cleaning is required. After the cement has set and the resilient centering cup around the pin has been removed and the rubber collar removed from the cap and head of the insulator they are suitable for successive use. The effective curing of the cement used in the assembly of these insulators without the need of steam or water vapor curing and of the apparatus required in that curing is an important advantage of this invention. Thus using the term "steam-free environment" to refer to a curing environment in which substantial amounts of steam or water vapor have not been introduced or injected in order to assist in the curing operation, it will be appreciated that this invention makes possible the curing of insulators within a steam-free environment. Although the invention is illustrated in its application to a suspension insulator, it will be apparent that it is equally applicable to other types requiring the assembly of a dielectric with the hardware by the use of cement.

When the word rubber is used anywhere herein, it will be understood to refer to those elastomeric materials commonly known in the art as synthetic and natural rubber. The word "plastic" is used in its broad sense to include plastic type materials, whether synthetic or natural, and thus includes natural and synthetic rubbers, together with all those materials commonly known in the art as "plastics."

The above and other objects and advantages of the invention are obtained from the construction and method illustrated in the accompanying drawings forming a part hereof and in which:

FIGURE 1 is an elevational view of a suspension insulator assembled according to this invention.

FIGURE 2 is a plan view of a rubber collar used in the assembly of the insulator with its hardware.

FIGURE 3 is a side elevational view of the rubber collar of FIGURE 2.

FIGURE 4 is an elevational view partly in section of the

dielectric or porcelain part of the insulator in its first step of assembly with the rubber collar of FIGURES 2 and 3 thereon.

FIGURE 5 is a top plan view of the dielectric and collar assembled.

FIGURE 6 is a vertical sectional view of the insulator assembled with its hardware and with the resilient members of this invention in place.

FIGURE 7 is an enlarged fragmentary sectional view of the cap and insulator assembled with the collar in place.

FIGURE 8 is an elevational view partly in section of the pin centering cup of this invention.

FIGURE 9 is an inverted plan view of the cup of FIGURE 8.

In the drawings similar numerals refer to similar parts throughout the several views.

The dielectric or porcelain portion of the insulator **1** has a head **2** with a pinhole **3** therein and ridges **4** with alternate grooves **5** forming corrugations in the lower face of the disk-like member of the porcelain insulator or dielectric, the corrugations, pinhole and head all being concentric one with the other. The outside of the insulator and the inside of the pinhole are fired with roughened surfaces **6** and **7** respectively while the exposed surface **8** is fired with a gloss finish.

A rubber collar **9** with an opening **10** therein is fitted securely over the head of the insulator and a measured portion of cement **11** is placed within the cap **12** which is then inverted over the head **2** of the insulator and some cement **13** may exude from the joint as shown in FIGURE 7. Prior to placing the cement in the cap it is preferably coated on the outside with paraffin or silicone which permits the rapid removal of this exuded cement therefrom. Since later steaming is not required, the paraffin or silicone prevents the adherence of the cement to the cap.

A further portion **14** of cement is then placed within the pinhole **3** of the insulator and the projecting end **15** of the pin **16** may likewise be coated with paraffin or silicone, this permitting the ready removal of any unwanted cement therefrom. The shank of the pin **16** is then placed within the cement in the pinhole and the centering cup **17** is placed over the projecting end **15** of the pin. The centering cup has a central opening **18** in which the projecting end of the pin fits securely, it also has a downwardly projecting lip or skirt **19** which securely fits in one of the concentric grooves **5** of the insulator as shown in FIGURE 6. This centering cup therefore centers the pin as well as sealing the cement within the pinhole from the outer air, it seals in the mix water of the cement. It will be noted that the body of the cup is solid, not only to center the pin but to leave a relatively small air space above the pinhole cement to limit the space for evaporation of the mix water. After the assembly is effected as above described the insulator with the attached hardware and sealing members is put aside, preferably in a steam-free environment, until the cement is cured, the retained water within the cement being adequate in ordinary circumstances to effect the proper curing of the cement. In some cases a small portion of moisture could be added for the cement in the pinhole before tightly securing the cup. After suitable curing the elastic sealing members are removed and are adapted for successive use. It should be appreciated that an advantage of curing the cement according to my invention, without introducing it into a steam room, is to cause a retardation of the curing rate which, in turn, necessarily results in a strengthening of the cement.

It will be apparent that various modifications may be made in the constructions of this invention and the method of their application without departing from the scope of the invention.

What is claimed as new and is desired to be secured by Letters Patent is:

1. The method of setting the Portland cement in an insulator between its dielectric and its hardware, the hardware being an external cap and internal pin and the dielectric centrally providing an external head and internal socket respectively for the hardware, comprising the steps of placing hardenable moisture containing Portland cement within the cap and socket and inserting the head and pin respectively therein and sealing the cap and socket with respect to the surfaces of the insulator with a resilient, impervious, dry-sealing gasket means to tightly enclose said cement from the surrounding atmosphere to limit the loss of moisture from the cement during the curing therof.

2. The method of setting the moisture containing Portland cement on a dielectric of an insulator having concentric ridges and a socket in its lower face, the cement holding a pin in said socket, comprising the steps of placing a flexible, impervious cup over the pin end projecting from the insulator, the cup having a skirt extending closely adjacent the sides of one of said ridges to dry seal the cement in the socket from the loss of moisture therefrom, allowing said insulator with said cup over said pin to stand while curing of the cement proceeds, and removing said cup from said pin end projecting from said insulator.

3. The method of setting the moisture containing Portland cement on a dielectric of an insulator having concentric ridges and a socket in its lower face, the cement holding a pin in said socket, the method comprising placing a flexible plastic cup over the pin end projecting from the insulator, the cup having a skirt extending closely adjacent the sides of one of said ridges to seal the cement in the socket from the loss of moisture therefrom, and a socket to receive and center the pin in the insulator socket when the cup is centered by the ridge.

4. The method of setting the moisture containing Portland cement on a dielectric of an insulator having concentric ridges and a socket in its lower face, the cement holding a pin in said socket, comprising the steps of placing a flexible circular plastic member over the pin end projecting from the insulator, the member extending closely adjacent the sides of one of said ridges and having means to hold the pin concentric therewith to seal the cement in the socket from the loss of moisture therefrom, allowing said insulator with said flexible circular member in place to stand while curing of the cement proceeds, and removing said flexible member from said insulator.

5. The method of setting the moisture containing Portland cement between the metal cap-like holder and the head of a dielectric of an insulator of the type having lateral surfaces from which a head projects outwardly comprising coating the outside of the holder to avoid the sticking of the cement thereto, placing cement and then the insulator head in the holder and dry sealing with a rubber collar the holder tightly with respect to the lateral surfaces of the insulator to confine said cement within said holder to prevent the loss of moisture from the cement to allow setting of the cement with the retained moisture therein.

6. For use in the assembly of a dielectric of an insulator having on its under face a projecting circular rib and in the face a circular socket concentric with the rib and in which, when the insulator is inverted, is embedded the shank of a metal insulator pin in moisture containing Portland cement therein, the combination with said insulator and said pin of a resilient, impervious cup having internal socket forming surfaces configured to resiliently engage and support said pin substantially centered with respect to said socket, said cup having a depending skirt of substantially the diameter of said circular rib, said skirt being positioned on said insulator to contact continuously in sealing engagement one side of the projecting rib on the insulator.

7. The method of setting a fresh Portland cement joint in an insulator comprising tightly enclosing said joint within a closely confined space by a dry sealing member to seal the joint from a loss of moisture whereby proper hy-

dration of said cement will be realized without the introduction of moisture during setting.

8. The method of curing a freshly formed Portland cement joint in an insulator comprising tightly enclosing said joint within a closely confined space by means of a resilient, impervious member to dry seal it from the ambient atmosphere, placing said insulator with said enclosed joint in a substantially steam-free atmosphere and allowing it to remain therein during a substantial portion of the curing period of said cement.

9. A method of curing a Portland cement joint on an insulator body comprising closely confining said cement joint with an impervious permanently non-absorbed means that seats against surfaces on the insulator body and forms a substantially vapor tight seal therewith, placing said confined joint within a substantially steam-free environment and allowing it to remain therein at least during a substantial portion of the curing period of said cement, and removing the impermeable means to release said joint from confinement.

10. The method of assemblying and curing a wet porcelain cement joint between the metal cap and head of the dielectric body of an insulator of the type having lateral surfaces from which said head projects outwardly, comprising:

(1) fitting an annular, flexible rubber collar having a central opening therein, the peripheral surfaces of which opening are adapted to engage said head snugly, about said head with said collar covering the lateral surfaces adjacent said head,

(2) filling said cap with a quantity of wet porcelain cement,

(3) placing said cement containing cap over said head,

(4) and positioning said cap-insulator assembly for curing of said cement with the bottom of said cap supporting the weight of said dielectric body to allow said collar to be compressed between said cap and lateral surfaces of said insulator body to form a dry seal therebetween.



**References Cited** in the file of this patent

UNITED STATES PATENTS

| | | |
|---|---|---|
| 61,641 | Taylor | Jan. 29, 1867 |
| 1,446,067 | Reagan | Feb. 20, 1923 |
| 1,556,029 | Reagan | Oct. 6, 1925 |
| 2,135,326 | Calland | Nov. 1, 1938 |
| 2,376,414 | Billner | May 22, 1945 |
| 2,879,323 | Nichols et al. | Mar. 24, 1959 |

FOREIGN PATENTS

| | | |
|---|---|---|
| 726,224 | Great Britain | Mar. 16, 1955 |