Dec. 10, 1935. K. A. HAWLEY 2,023,808

SHIELDED CEMENTED TYPE INSULATOR

Filed Feb. 16, 1933 2 Sheets-Sheet 1

Fig. 1.

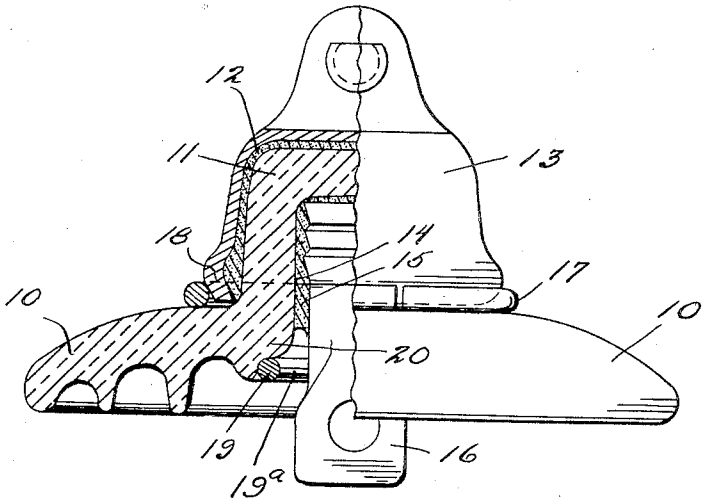

Fig. 3.

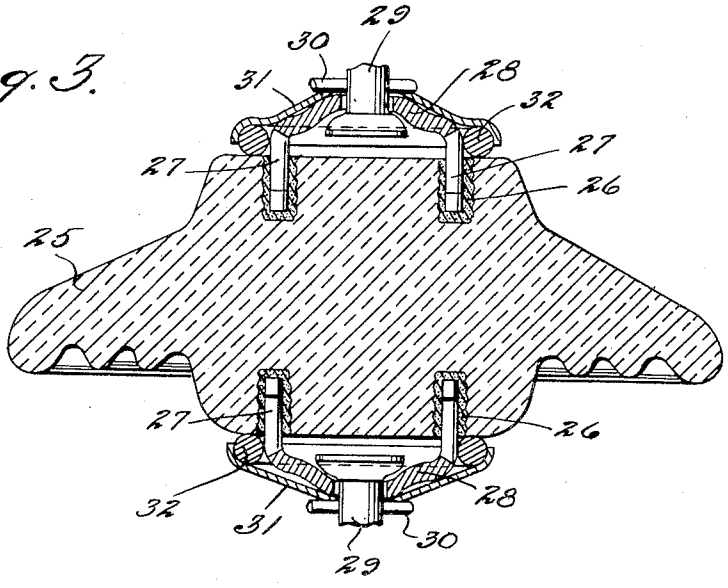

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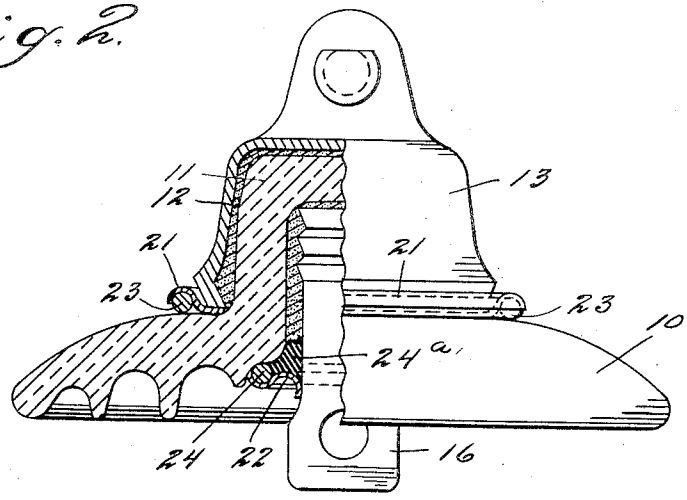
Fig. 2.



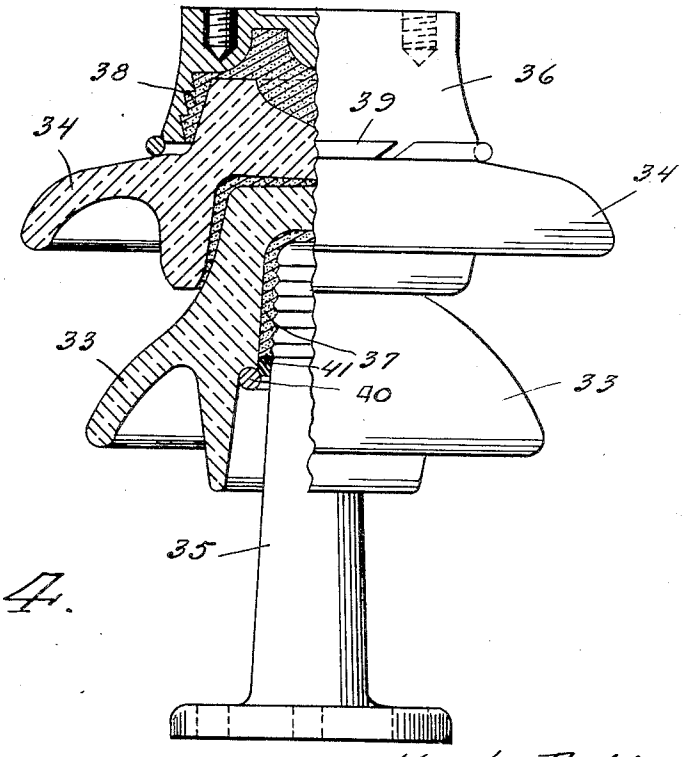


Fig. 4.

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Patented Dec. 10, 1935 2,023,808

UNITED STATES PATENT OFFICE

2,023,808

SHIELDED CEMENTED TYPE INSULATOR

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Application February 16, 1933, Serial No. 657,092

5 Claims. (Cl. 173—318)

The invention relates to insulators of either the suspension, pedestal or in fact any other type having associated therewith as a part of the assembly metallic fittings or hardware cemented in place.

It has been discovered that in many direct current installations where insulators having cemented caps, posts, pins or other equivalent parts are used, an electrolytic action takes place particularly in case the insulator is used in a locality where it is more or less continually exposed to moisture, steam, smoke or chemical fumes, with the result that the metallic fittings are eaten away with more or less rapidity, the insulator eventually becoming useless. Many theories have been advanced in the past in the endeavor to explain this condition but I have concluded that the eating away or corrosion of the metal is not merely the result of the rusting of the hardware in the sense that iron rusts as the fact remains that decomposition or disintegration may occur even though the hardware is of some material other than of a ferrous nature. In support of my belief or conclusion I may add that by actual inspection I have discovered upon insulators a whitish deposit adjacent the metallic fittings, this being unquestionably a salt formed by decomposition of the zinc which constitutes the usual galvanized protective coating. Moreover I have determined that the electrolytic decomposition is produced on account of the presence of the cement through which or along which the inevitable leakage currents naturally flow.

Electric currents flow through Portland cement as through an electrolyte because of the water it contains. There is therefore decomposition of metal parts below the surface of the cement, especially as is well known in connection with electrolytic action, on that side where current flows from the metal to the cement. This is where the metal parts are positive with respect to the cement. The resulting formation of electrolytic salts increases the total volume of material within the insulator and causes destructive pressures on the porcelain.

Similar electrolytic action occurs when current leaks from hardware on an insulator into a moisture film even though there is no cement used in the insulator assembly, for instance in the type of insulator disclosed in Johnston Patent No. 1,329,770. In this case corrosion of supporting parts will result. The object of the invention in this case is to provide a shield so that the current will leak from the shield with resulting destruction of it rather than of the working parts of the insulator.

With the above facts in view I have devised the present invention which has for its general object the provision of means forming part of insulators intended to be used in connection with direct currents for shielding the insulators against the destructive electrolysis.

An important and somewhat more specific object of the invention is to provide in an insulator of this type and for this purpose means operating to short circuit the cement at the joints between the dielectric material and the hardware.

Another object of the invention is to provide in an insulator of the cemented type conducting means bridging across the cement joints and providing a path for leakage currents of so much greater conductivity than the cement itself that the cement will carry no part, or substantially no part, of the current flow, thereby eliminating the electrolytic action and greatly prolonging the life of the insulator.

Another object is to provide shielding means of this character which may be readily applied to already existing insulators just as easily as it may be built into new ones during their manufacture, the idea being, moreover, that the shield means may be removed and replaced in the event of any such necessity, without it being necessary to disturb the insulator itself.

An additional object is to provide shielding means of this character which will be very simple and inexpensive to make in addition to being easy to apply and which will also be efficient and durable in service, and a general improvement in the art.

To the attainment of the foregoing and other objects and advantages, the invention preferably consists in the details of construction and the arrangement and combination of parts to be hereinafter more fully described and claimed, and illustrated in the accompanying drawings in which:

Figure 1 is a view partly in elevation and partly in section showing a suspension insulator of the cap and pin type equipped with one form of my invention,

Figure 2 is a similar view showing a modification,

Figure 3 is a sectional view through a different form of suspension insulator and showing the invention applied thereto,

Figure 4 is a view partly in elevation and partly in section showing the invention applied to an insulator of the pin or post type.

Referring more particularly to the drawings

and especially Figures 1 and 2, I have disclosed a suspension insulator of the cap and pin type, the insulator comprising a porcelain body 10 having an upstanding neck 11 upon which is secured as by cement 12 a metallic cap 13. The stem is formed with a recess 14 within which is embedded as by cement 15 a pin 16. The cap and pin may be of any of the well known varieties as far as concerns the proposition of connecting a series of such insulators in a string or chain and for supporting them, etc.

In carrying out what is probably the simplest form of the invention, reference should be had to Figure 1, wherein it will be observed that I short circuit the cement 12 by the simple expedient of providing a ring 17 of relatively soft metal arranged in embracing relation to and in contact with the bell of the cap 13 and also in contact with the top surface of the porcelain body 10. A ring such as this may be simply a split ring with its ends abutted or overlapped, this being immaterial, the purpose being to facilitate or in fact permit it to be engaged about the cap and then compressed so as to contact therewith and with the porcelain body, it being observed that the downward taper of the bell portion 18 of the cap will prevent the ring from riding upwardly out of engagement with the porcelain surface. For short circuiting the cement mass 15 which embeds the pin, I may provide a similar ring 19 of expansible type which is frictionally engaged within the innermost petticoat 20 of the insulator in concentric relation to the cavity 14. Any means, such as spider arms, a tongue, jumper wire or the like indicated at 19a may be provided on this ring to contact and establish electrical connection with the pin so as to provide a path for leakage currents which will exclude the cement mass 15.

As a variation I may resort to the arrangement shown in Figure 2 wherein in addition to the simple rings above described I provide sheet metal shields 21 and 22 of ring-like form, the former being engaged beneath the edge of the cap and over a ring 23, corresponding to the ring 17, and the latter engaging beneath a ring 24 corresponding to the ring 19 and having its inner portion bearing against the pin. The shields 21 and 22 may be split in the same manner as the rings or in fact any equivalent device or expedient may be resorted to which will enable assembly. In this case no jumper or spider arms are needed on the ring 24 as the member 22 provides the electrical connection. The space between the rings 22 and 24 and the cement which embeds the pin may be sealed by some bituminous substance indicated at 24a.

Broadly considered, the same scheme may be carried out in connection with insulators of still other types, for instance the suspension type with embedded hardware shown in Figure 3. Referring to this figure in detail the numeral 25 designates a porcelain insulator body formed with recesses in its top and bottom within which are secured, by masses of metal 26, the legs 27 of terminal fittings 28 of more or less spider-like form, which fittings are centrally apertured and laterally slotted, in accordance with well known principles of design, for the reception of headed suspension elements 29 which are held against longitudinal displacement by transverse members 30 which in actual practice may be cotters. In carrying out the invention in connection with an insulator of this variety, I make use of a disk-like sheet metal shield 31 located outwardly of each of the terminal fittings 28, the shield being suitably apertured for the accommodation of the suspension element 29 and being held in place by the member 30. The shields 31 are of appropriate shape in cross section to provide or define a channel portion which will act to engage substantially conformingly against and retain conducting rings 32, preferably of soft metal, which bear closely against the porcelain surface at the top and bottom of the insulator outwardly of the series of recesses or sockets which receive the legs 27. It is intended that the metallic shields 31 be rather springy in their nature so as to maintain a close engagement between the rings 32 and the porcelain. The purpose of the shields in this instance is so that surface leakage over the porcelain will leave one terminal through one shield and will enter the other terminal through the other shield without flowing from the porcelain onto the spider legs 27.

For applying the invention to insulators of the pin or post type such as shown in Figure 4, it is merely necessary to make use of rings similar to those in Figure 1. Figure 4 discloses a post type insulator including nested porcelain shells 33 and 34, the former having embedded within a cavity therein the metallic pin or post 35, and the latter carrying a metallic cap 36. The post is secured within the lower shell 33 by a mass of cement 37 while a similar mass 38 is provided for securing the cap in place. In adapting the invention to an insulator of this variety, I provide a ring 39, corresponding exactly to the previously described rings, and which is engaged closely against the edge of the cap 36 and the top surface of the upper shell 34 so as to provide a leakage path which excludes the cement mass 38. Moreover a similar ring 40 is located at the intermediate portion of the cavity in the lower shell either in direct contacting relation to the pin or post 35 or at least electrically connected therewith by some appropriate means which could be as in Figure 1 or some conducting substance 41 introduced between the ring and the post and filling the space between them and the cement.

The result of providing the rings in each and every instance disclosed and under similar or analogous circumstances or conditions as well as in different structures is to provide in every case a path for leakage currents which will prevent such currents, or at least substantially prevent them, from passing through the cement and setting up a destructive electrolytic decomposition. Naturally there will be a certain amount of electrolysis but it should be remembered that it occurs at the ring itself and as this ring is purposely made so as to have considerable mass it is capable of withstanding the action for a prolonged period instead of the disintegration taking place in the metallic fittings themselves. Manifestly after a sufficient electro-chemical action has taken place as will cause a material reduction in the mass of the protective shielding ring they may be replaced by new ones and the insulator thus rejuvenated.

From the foregoing description and a study of the drawings it will be apparent that I have thus provided adequate protection for cemented type insulators which will avoid their destruction when used in association with direct current lines. The problem discussed is not present in the handling of alternating currents as they do not set up any such electrolytic action as that mentioned. It will be noted that the invention is very inexpensive and simple to carry into practice and

that the device may be readily installed upon already existing insulators without altering them in any way, a factor which is important when economy is considered.

While I have shown and described the preferred embodiments of the invention, it should be understood that the disclosure is merely an exemplification of the principles involved as the right is reserved to make all such changes in the details of construction as will widen the field of utility and increase the adaptability of the device provided such changes constitute no departure from the spirit of the invention or the scope of the claims hereunto appended.

Having thus described the invention, I claim:

1. In an insulator comprising a dielectric body having a metallic cap secured thereto by a cement joint, shielding means comprising a massive metallic split spring ring arranged in surrounding relation to the metallic cap and having electrical contact with the surface of the dielectric body and physically engaging the same.

2. In an insulator comprising a dielectric body having a metallic fitting secured thereto by a cement joint, means for preventing electrolysis of the fitting under the influence of direct currents leaking over the insulator, comprising a metallic split ring arranged in physical and electrical contact with the surface of the dielectric body, and a disk of conducting material arranged in surrounding relation to the fitting and in electrical contact therewith and with the ring.

3. In combination with an insulator comprising a dielectric body and a metallic fitting secured thereto by a cement joint, a metallic shield formed as an expansible split ring surrounding the fitting in physical and electrical contact with the adjacent surface of the dielectric body, and a metallic disk in electrical and physical contact with and interposed between the fitting and ring thereby providing a leakage current path excluding the cement.

4. In combination with an insulator comprising a dielectric body and metallic fittings secured to opposite sides of the body by cement joints, shielding means comprising a split ring of conducting material at each side of the body arranged in contacting relation to the outside of the adjacent fitting and to the dielectric body, and a disk carried by each fitting and frictionally contacting the adjacent ring.

5. In combination with an insulator comprising a dielectric body and a metallic fitting secured thereto by a cement joint, shielding means comprising a ring of conducting material arranged in contacting relation to the outside of the fitting and to the dielectric body, and a disk carried by the fitting and frictionally contacting the ring.

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