April 8, 1924. 1,489,809

A. O. AUSTIN

INSULATOR

Filed Sept. 5, 1919 2 Sheets-Sheet 1

Fig. 1.

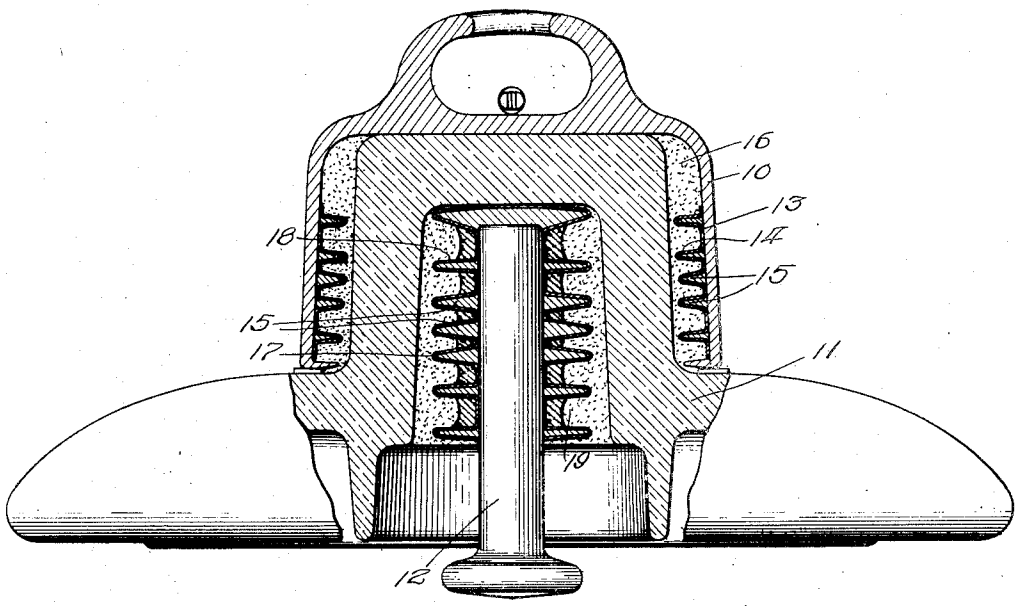


Fig. 2.

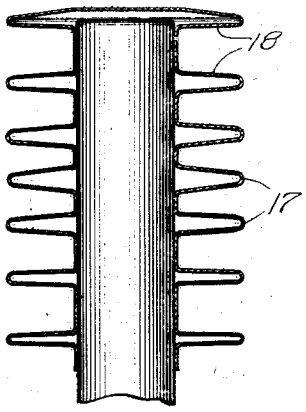


Fig. 3.

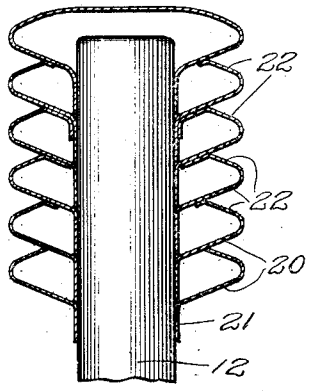
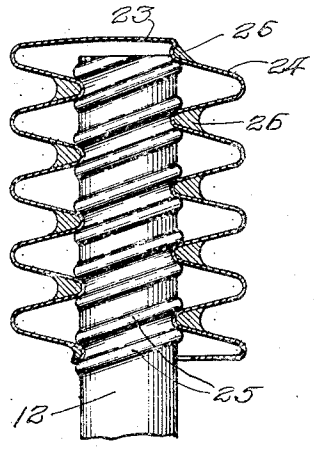


Fig. 4.



Witness:
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Fig. 5.

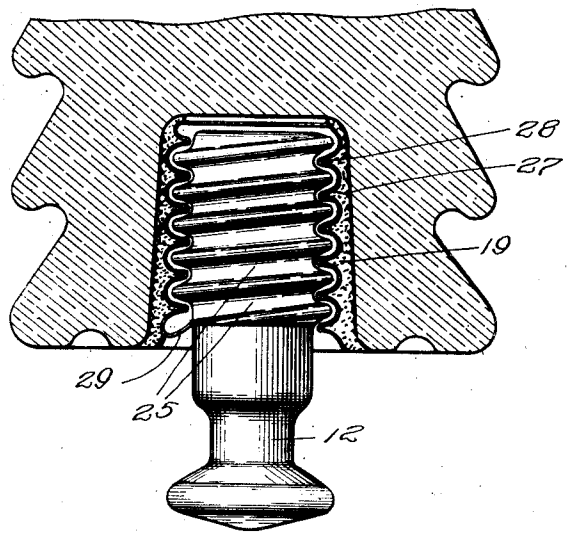


Fig. 6.

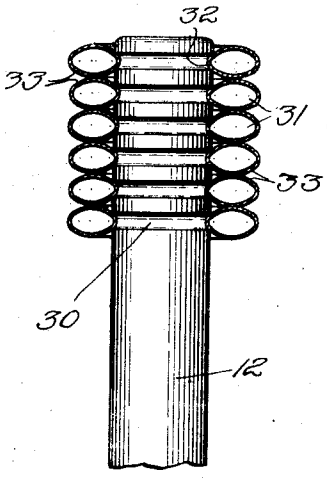


Fig. 7.

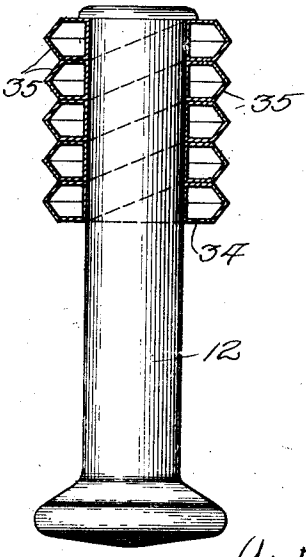
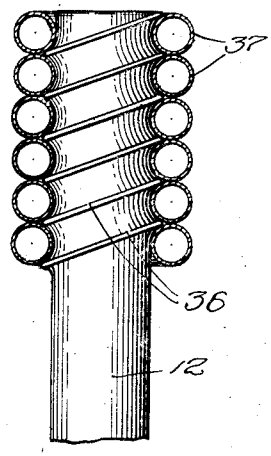


Fig. 8.



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Attys.

Patented Apr. 8, 1924. 1,489,809

UNITED STATES PATENT OFFICE.

ARTHUR O. AUSTIN, OF BARBERTON, OHIO, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE OHIO BRASS COMPANY, OF MANSFIELD, OHIO, A CORPORATION OF NEW JERSEY.

INSULATOR.

Application filed September 5, 1919. Serial No. 321,837.

To all whom it may concern:

Be it known that I, ARTHUR O. AUSTIN, a citizen of the United States, residing at Barberton, in the county of Summit and State of Ohio, have invented certain new and useful Improvements in Insulators, of which the following is a specification.

This invention relates to electric insulators and has for its object the provision of a device of the character named in which resilient means is provided for transmitting stresses from one part to another and which shall be of improved construction and operation.

The invention is exemplified in the combination and arrangement of parts shown in the accompanying drawings and described in the following specification, and it is more particularly pointed out in the appended claims.

In the drawings,—

Fig. 1 is a sectional view of one form of insulator embodying the present invention.

Figs. 2, 3 and 4 show insulator pins illustrating modifications of the invention shown in Fig. 1.

Fig. 5 is a fragmentary sectional view of a different form of insulator having a modification of the invention applied thereto.

Figs. 6, 7 and 8 show insulator pins illustrating other modifications of the invention.

In my prior Patent No. 1,284,976, dated November 19, 1918, I have shown an insulator arranged to distribute stresses transmitted from one part to another in a manner to reduce the danger of cracking or breaking the fragile parts. The present invention provides certain improvements over the insulator shown in the prior patent referred to. In the drawing, the numeral 10 designates a metallic insulator cap connected with a dielectric member 11 which is provided with a central pin 12. Secured to the inner face of the cap 10 is a resilient sheet metal member 13 corrugated to form inwardly projecting flanges 14 extending around the inner face of the cap. The flanges 14 are spaced from one another, as shown in the drawings, and may be arranged more closely together near the central portion of the member than they are adjacent its outer edges. The sheet material 13 is secured to the inner face of the cap 10 in any desirable manner such as by spot welding, galvanizing or pressing or expanding into grooves. If the parts are galvanized in any usual way after they have been assembled the coating material will serve to secure the parts together. The cap 10 is secured to the outer face of the dielectric member 11 by cement 16 engaging the flanges 14 and the outer face of the dielectric member. In some cases there may be a tendency for the material, with which the flanged sheet is secured to the cap, to be drawn into the open space in the flanges, by capillary action or by a combination of capillary action and atmospheric pressure during cooling. Metal thus drawn into the flanges would, when it has hardened, impair the resiliency of the flanges. This may be avoided by placing filling material such as asbestos, cotton, paper or other substance in the space within the flanges. This tendency may also be overcome by separately galvanizing the parts and subsequently placing them together under sufficient heat to cause them to be secured by the galvanizing substance in the presence of a suitable flux. Unequal pressure conditions between the interior of the flanges and the outer atmosphere may be avoided by venting the flanges if desired.

Flanges 17 formed by corrugations in a yielding sheet metal member 18 are secured to the periphery of the pin 12 in a manner similar to that of the flanges 14 on the inner face of the cap 10 and the space within the flanges 17 may be filled with the material 15, as explained in connection with the flanges on the cap. The pin 12 is held in the space within the dielectric member by cement 19 engaging the flanges and the inner face of the dielectric member. The flanges 17 are preferably unequally spaced along the pin as explained in connection with the flanges on the cap and this unequal spacing is for the purpose of distributing the stresses transmitted from the pin to the dielectric member. It will be apparent that the greater stress will be transmitted at the point where the flanges are most unyielding, and that the more closely the flanges are spaced together, the less the amount of yielding will be and the greater will be the amount of stress transmitted from one member to the other. The arrangement shown in the drawing will permit the largest amount of stress to be transmitted at the central portion of the flanged part of

the pin and the amount of stress transmitted will gradually decrease toward the ends of the flanged part. This arrangement has been found to be effective in reducing dangerous stresses tending to crack and break the dielectric and hence permits of heavier loads for an insulator of a given size. In the form of pin shown in Fig. 2 an arrangement similar to that in Fig. 1 is employed except that the filling 15 within the flanges is omitted. In the form shown in Fig. 3, the flanges are provided by separately formed rings 20 of sheet material having sleeves 21 by which they are secured to the pin 12 and having inwardly bent portions 22 which provide bearing surfaces for engagement with the material for connecting the pin with the dielectric member. In the form of the invention shown in Fig. 4, a sheet metal thimble 23 is pressed to form corrugations 24 which are arranged in the shape of threads of a screw. The pin 12 is provided with a helical groove 25 onto which the bases of the threads 24 may be screwed to hold the sleeve 23 in place. In this form of the invention the grooves at the bases of the threads 24 are preferably filled with yielding material 26 such as paraffin or wax, so that the fragile material or cement against which the threads 24 bear will not engage the sheet metal member 23 at points where it is rigidly backed by the pin 12. It will be understood that in all of the forms of the invention described, the flanges provided by the corrugated sheet metal not only yield as a whole, but give at any point where they are subjected to an excess stress so that it is impossible for the stress to be concentrated at any one point. This is a very valuable feature for the reason that the concentration of stress at any particular point on a dielectric member is liable to produce cracking or breaking of the member even when the load carried thereby is not nearly equal to the amount of load that could be carried if the stress were properly distributed. With a sheet metal connecting member of proper thickness to provide sufficient resiliency to prevent concentration of stresses the member may, in some cases, be screwed directly into the porcelain without the interposition of cement. The bearing upon the porcelain will be effected entirely by the yielding sheet metal, thus avoiding concentration of stresses such as is present where a rigid member bears directly on the porcelain or cement, or where a rigid member bears on a face of a thin member or shell directly opposite a point of contact with the cement or other solid material.

In the form of this invention shown in Fig. 5, a sheet metal thimble 27 is formed with thread-shaped grooves having their inner points pinched together or compressed to small proportions forming thin ribs 28 which bear on the bases of the grooves 25 in the pin 12. With this arrangement the necessity of a filling at the root of the grooves in the thimble is removed because of the relatively small size of the ribs 28. The edge of the sleeve may be bent back as shown at 29 to provide a lock for the pin to prevent its unscrewing under load. It will be understood that the form of sleeves shown in both Figs. 4 and 5 may be secured in place by other means than by screw threads, such as are described in connection with the other figures of the drawings. This form when applied to the pin or cap by means of screw threads, makes the parts detachable similarly to the parts in my prior Patent No. 1,291,713, dated January 21, 1919. Unless the portion of the thimble which engages the pin has considerable yield, the stresses will be concentrated on the cement and may cause the dielectric to break. A loosely fitting pin in a sleeve is not sufficient to safeguard the dielectric except on light loads, as any unevenness between the two shells will permit of a localized bearing of the pin giving concentration of stresses owing to the rigid nature of the cement backing the thimble. If distribution of stress is obtained by a good fit between the thimble and the pin, the cement and dielectric will be subjected to stress produced by the expansion or contraction of the large body of metal in the pin. Where a close fit is obtained practically no graduation in the distribution of stress can be obtained for the applied load. The form of device shown in the present invention obviates these difficulties.

In Fig. 6 the insulator pin 12 has a helical groove 30 formed thereon and a hollow tube 31 is wound in this groove so that the different turns of the tube contact with one another. The tube is of relatively thin resilient material and may be of various cross sectional shapes. In the drawing, Fig. 6, the tube is somewhat deformed from a circular cross-section to provide ribs 32 fitting in the groove 30 and to provide bearing surfaces 33 for engaging the cement or other holding material with which the pin is connected with the dielectric member. The tube may be fastened at its ends in any suitable manner to prevent unwinding and sufficient pressure may usually be secured between the tube and its groove in winding the tube to hold it in place. It may, however, be fastened by brazing, welding, galvanizing or other suitable means in cases where conditions require. A rigid connection of this kind between the tube and pin will lessen the amount that the tube will yield under the stresses to which it is subjected which may be desirable in some cases.

In Fig. 7 a tube 34 is wound on the pin 12 but in this case the inner walls of the tube

are flattened so that they fit will closely against the pin and against one another. The outer walls may also be flattened to provide angularly disposed bearing faces. This tube may be brazed or otherwise secured to the pin to hold it in place.

In Fig. 8 the pin 12 is shown as provided with thin resilient helical ribs 36 and a tube 37 is wound in the groove between these ribs, bearing on the ribs and the base of the groove. This tube may be held in place in any of the ways mentioned in connection with Fig. 6.

In all three of the forms shown in Figs. 6, 7 and 8 a hollow cellular structure is provided having yielding walls for engaging the cement with which the pins are secured to the dielectric member. The fact that only resilient walls contact with the cement prevents concentration of stresses in the cement or insulating member, and the pins with these forms of connection may even be screwed directly into the dielectric member without the interposition of cement. The arrangements shown in connection with pins in Figs. 6, 7 and 8 are, of course, applicable to caps as well as pins.

The cross-sectional areas of the supporting parts such as 10 and 12, as shown in the drawings, are preferably much greater than the sectional areas of the sheet flanges so that the distribution of the stresses will depend upon the resiliency of the flanges and will not be materially affected by any elongation of the supporting members.

I claim:

1. In combination, an insulator comprising a plurality of parts, a sheet of thin resilient material bent to form projections extending from one of said parts and secured to said part at spaced intervals thereon, the intermediate portion of said sheet being resiliently supported by the attached portions thereof, and means for connecting said projections with another of said parts for transmitting stress from one part to the other.

2. An insulator comprising a plurality of parts, a sheet of relatively thin resilient material connected with one of said parts and bent to form flanges, having spaced walls, projecting from said part, said sheet being secured to said part at the bases of said flanges and unattached thereto at points removed from said bases, and means for connecting said projecting flanges with another of said parts to transmit stress from one of said parts to the other.

3. An insulator comprising a holding member and a dielectric member, a sheet of relatively thin resilient material secured to said holding member and bent to form flanges with spaced walls projecting from said holding member and free to yield to pressure thereon, said sheet having supporting connection with said holding member at spaced intervals thereon adjacent the bases of said flanges, and means for securing said holding member with said dielectric member to form a resilient connection between said members.

4. An insulator comprising a holding member and a dielectric member, and a sheet of relatively thin resilient material bent to form flanges with spaced walls, said sheet being fixedly secured to said holding member adjacent one edge of each of said flanges leaving the other edge of each flange free, said flanges being connected with said dielectric member for providing resilient connection between said holding member and said dielectric member.

5. An insulator comprising a holding member and a dielectric member, said holding member having hollow projections thereon secured to said holding member adjacent the bases thereof, and at spaced intervals along said holding member, and means for securing said projections to said dielectric member, the walls of said projections being free to yield to external pressure thereon.

6. An insulator comprising a holding member and a dielectric member, said holding member having hollow projections thereon, yielding non-gaseous material within said hollow projections, and means for securing said projections to said dielectric member to provide yielding connection between said holding member and said dielectric member.

7. An insulator comprising a holding member and a dielectric member, projections on said holding member formed of relatively thin resilient sheet material constituting yielding walls for said projections, said sheet material being fixedly secured to said holding member adjacent one edge of each of said projections, the other edge of which is yieldingly supported by the intervening sheet of material, the points of connection with said holding member being distributed at spaced intervals along said holding member, and means for connecting said projections with said dielectric member so that said projections will transmit stress from one of said members to the other.

8. An insulator comprising a holding member and a dielectric member, a connection between said members comprising a sheet of relatively thin material secured to said holding member and bent to form hollow yielding flanges projecting from said holding member, said flanges being unequally distributed on said holding member and individually secured thereto, and means for securing said flanges to said dielectric member.

9. An insulator comprising a dielectric member and a holding member, a connection

between said members comprising a sheet of relatively thin resilient material having portions thereof secured to said holding member and intermediate portions thereof bent to form hollow flanges projecting from said holding member, said flanges being connected with said dielectric member and differing from one another to provide different degrees of resiliency in the connection between said holding member and said dielectric member at different positions on said holding member.

10. An insulator comprising a holding member and a dielectric member, means for resiliently connecting said members to one another comprising a sheet of relatively thin resilient material fixedly secured to said holding member at different points thereon, the portions of said sheet intermediate said points being bent to form hollow projections extending from said holding member, and means for connecting said projections with said dielectric member, said projections being differently arranged at different points on said holding member to provide different degrees of resiliency between said holding member and said dielectric member at different points on said holding member.

11. An insulator pin comprising a rigid member, and a sleeve formed of a sheet of relatively thin resilient material secured to said rigid member at spaced intervals along the length of said rigid member with intervening portions of said sleeve free to yield relative to said rigid member and bent to form hollow resilient projections extending from said rigid member, the points of attachment being distributed along said rigid member in spaced relation to one another.

12. An insulator pin comprising a rigid member, and a sleeve of relatively thin resilient material bent to form peripheral corrugations on said sleeve, said sleeve having the edges of said corrugations on one face of said sleeve, fixedly secured to said rigid member.

13. An insulator comprising a dielectric member and a holding member, a sleeve of relatively thin resilient material secured to said holding member and bent to form projections extending therefrom, and yielding material arranged to cover said sleeve adjacent points of contact between said sleeve and said holding member while portions of said projections spaced away from said holding member are free from said yielding material so as to form connection with said dielectric member.

14. An insulator comprising a holding member, a sheet of relatively thin resilient material connected with said holding member and corrugated to form projections extending therefrom, and a coating of yielding material at the bases of said projections adjacent points of contact between said holding member and said sheet of resilient material, the extremities of said projections being free from said yielding material.

15. An insulator comprising a plurality of parts and a member for transmitting stress from one of said parts to another, said member comprising hollow portions, each having a relatively thin resilient wall with a portion of one face thereof arranged to bear on one of said parts, while the opposite face of said wall adjacent said bearing portion is free from rigid support, said member being rigidly secured to each of said parts at intervals distributed over the surfaces thereof to facilitate transmission of force from one to the other thereof.

16. An insulator comprising a plurality of parts and a member for transmitting stress from one of said parts to another, said member comprising hollow portions each having a relatively thin resilient wall, portions of the outer face of which are arranged to bear upon one of said parts, while the inner face of said wall adjacent said bearing portions is free from rigid support, leaving said bearing portions free to yield under force exerted thereon, the inner face of said wall being rigidly connected with the part adjacent thereto at distributed points over the surface of said part to facilitate transmission of stresses from one of said parts to the other.

17. An insulator comprising a pair of parts, a closed thimble of sheet material on one of said parts, said thimble having portions arranged to contact with the other of said parts to transmit stress from one of said parts to the other, said contacting portions of said thimble being free to yield under the stress transmitted thereby while other portions of said thimble are rigidly connected with said first-mentioned part at points alternating with said contacting portions.

18. An insulator comprising a pair of parts, a thimble of sheet material bent to form hollow flanges on one of said parts, said flanges having portions thereof arranged to contact with the other of said parts to transmit stress from one of said parts to the other, said contacting portions of said flanges being free to yield under the stress transmitted thereby and rigid connections between said thimble and said first-mentioned part adjacent the bases of said flanges.

19. An insulator comprising a pair of co-operating parts and a resilient sleeve interposed between said parts for transmitting stress from one of said parts to the other, said sleeve being arranged to contact with each of said parts at different posi-

tions thereon and spaced therefrom at intermediate positions, the points of contact with the two parts alternating with one another for transmitting stress from one of said parts to the other, said sleeve being subjected to higher stress per unit section than the parts connected thereby.

20. An insulator comprising a dielectric member, and a member for transmitting stress to said dielectric member, said last named member comprising a main body portion and a closed thimble of resilient material carried thereby, said thimble having contact portions thereof connected with said dielectric member and subjected to higher stress per unit section than said main body portion, to provide resilent connection between said dielectric member and said main body portion, said thimble being rigidly secured to said main body portion at spaced intervals along the length of said body portion.

21. An insulator comprising a holding member, a dielectric member, and means for securing said members to one another, said securing means comprising a relatively thin sheet of material bent to provide hollow portions having contact parts thereof, connected with said dielectric member, the face of said sheet opposite said dielectric member and adjacent the parts thereof connected with said dielectric member, being free from direct connection with said holding member to permit yielding of said contacting parts under stresses transmitted thereby while intermediate portions of said face are rigidly secured to said holding member.

22. An insulator comprising a plurality of parts, a resilient sheet metal member connected with one of said parts and arranged to form a hollow cellular structure having yielding walls secured to said part adjacent each cellular division, and means for connecting the yielding walls of said cellular structure with another of said parts for transmitting stress between said parts.

23. An insulator comprising a holding member and a dielectric member, said holding member having hollow cellular projections thereon with resilient walls secured to said holding member adjacent each cellular division, and connecting material engaging said walls for securing said holding member with said dielectric member.

In testimony whereof I have signed my name to this specification on this 18th day of August, A. D. 1919.

ARTHUR O. AUSTIN.