May 3, 1960 R. L. SHOWMAN 2,935,553

ELECTRICAL KNOB INSULATOR

Filed Aug. 13, 1958

FIG. 3.

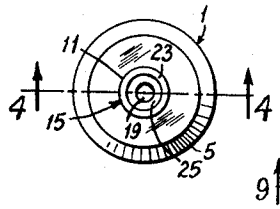


FIG. 6.

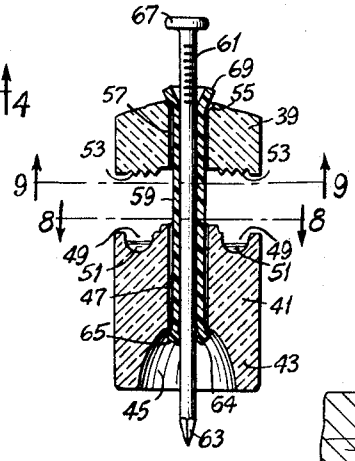


FIG. 7.

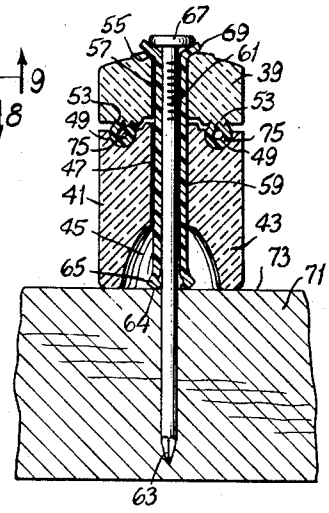


FIG. 2.

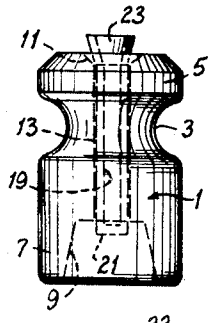


FIG. 1.

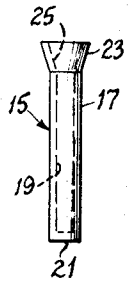


FIG. 4.

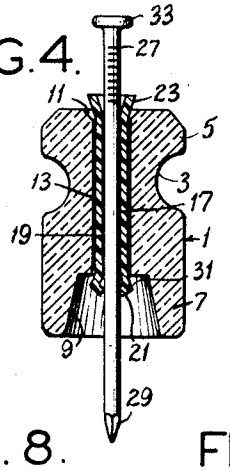


FIG. 5.

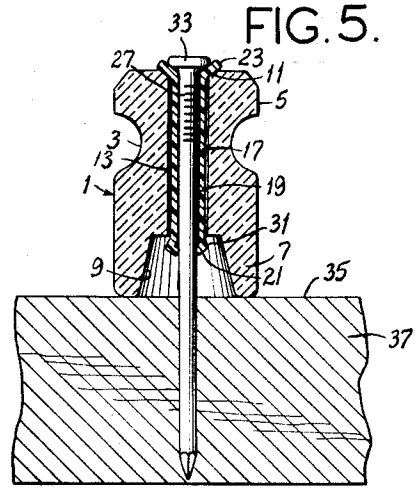


FIG. 8.

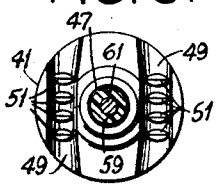
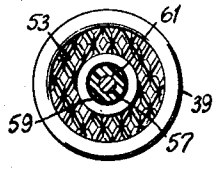


FIG. 9.



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ELECTRICAL KNOB INSULATOR

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2 Claims. (Cl. 174—157)

This invention relates to insulators and their assembly, and with regard to certain more specific features, to insulators adapted to be nailed in place for supporting wires.

Among the several objects of the invention may be noted the provision of a low-cost insulator assembly adapted safely to be nailed into steadier wire-supporting position without breakage; the provision of an insulator of the class described having superior insulating properties; and the provision of an insulator of the class described adapted to be conveniently and inexpensively assembled as a unit for convenient handling, shipment and application. Other objects and features will be in part apparent and in part pointed out hereinafter.

The invention accordingly comprises the elements and combinations of elements, steps and sequence of steps, features of construction and manipulation, and arrangements of parts which will be exemplified in the structures and methods hereinafter describeed, and the scope of which will be indicated in the following claims.

In the accompanying drawings, in which several of various possible embodiments of the invention are illustrated,

Fig. 1 is a side elevation of an insulating nail-holding bushing employed in producing the new insulator;

Fig. 2 is a side elevation of an insulator in which the bushing of Fig. 1 is initially inserted;

Fig. 3 is a top plan view of Fig. 2;

Fig. 4 is a cross section taken on line 4—4 of Fig. 3, showing a nail inserted to produce a final three-part assembly ready for use;

Fig. 5 is a view similar to Fig. 4, but showing the assembly as nailed into wire-supporting position;

Fig. 6 is a view similar to Fig. 4, showing another form of the invention constituting a four-part assembly;

Fig. 7 is a view similar to Fig. 5, showing said four-part form; and,

Figs. 8 and 9 are cross sections taken on lines 8—8 and 9—9, respectively, of Fig. 6.

Corresponding reference characters indicate corresponding parts throughout the several views of the drawings.

The class of insulator to which the present invention applies is adapted to be nailed into position, being usually composed of a more or less frangible porcelain (or equivalent) sleeve or sleeves, having a hole or holes for loose acceptance of the supporting nail. Heretofore, the nail has been provided with a leather or like washer under its upper head to prevent fracture of the sleeve and sometimes with a lower metal collar to maintain a loose assembly prior to nailing. The application of this additional metal collar to maintain the assembly was costly. Since the assembly was more or less loose, it was therefore awkward to handle when nailing. Moreover the washer did not provide the optimum resilience against the final hammer blows applied to the nail in order to affix the insulator to its support. Lastly, the insulating properties depended entirely upon the insulation provided by

the frangible porcelain sleeve which, if broken, reduced the insulating value.

My invention eliminates the time-consuming and costly application of the metal washer in order to effect assembly, provides insulation in addition to that of the porcelain or like sleeve and provides an improved resilient seat for the nail when hammered into holding position. Moreover, the assembly is not so loose, thereby providing better handling properties for nailing.

Referring now more particularly to the drawings, Figs. 1–3 show three basic parts of a first form of the invention. Numeral 1 indicates a porcelain (or electrically equivalent) insulating sleeve having an outside groove 3 for wire mounting. Groove 3 is located between an upper head 5 and a lower skirt 7. Within the skirt is a recess or socket 9, and in the head is a bevel 11. The socket 9 and bevel 11 are connected by a hole 13. Insulating sleeves of this type are usually frangible.

At 15 (Fig. 1) is shown an elongate plastic cup-shaped bushing, constituted by a hollow sleeve or cylinder 17, having a central passage 19 enclosed at the lower end by a bottom as shown at 21. The cylinder 17 is flared at its upper end, as shown at 23, the passage 19 terminating conically in the flare 23, as shown at 25. The bushing 15 is composed of a tough resilient insulating material such as nylon, polyethylene or like thermosetting or thermoplastic resin molded to the cup shape shown in Fig. 1. This is accomplished by injection or compression molding of the resin, which sets in said resilient state. The particular resin to be chosen should be weather-resistant, have high electrical insulating properties, and should be resilient or yieldable, that is rubber-like, and tough, as distinguished from frangible. In short, it should be deformable without fracture, so that, for example, a nail may be driven through the closed end 21 to expand this end without fracture (for purposes to appear), and also so that the head of a nail 27 may be driven to seat resiliently in the flare 23 without fracture of the sleeve 1. The fit between the outside of the cylinder 17 and the inside of the hole 13 should be a snug sliding one, so that the bushing 15 as a whole may be conveniently inserted into the sleeve 1 through the bevel 11. The final position is one in which the flare 23 of the bushing 15 is adjacent the bevel 11, and its bottom 21 is just within the lower socket 9.

Next the nail or fastener 27, which is to form a captive part of the assembly, is inserted point first into the bushing 15 and driven into the position shown in Fig. 4, wherein the point 29 has pierced the bottom 21, thus breaking the bottom open to expand and form a shoulder or flare 31 larger than the diameter of the hole 13. Preferably the outside diameter of the nail 27 and the inside diameter of the bushing 15 are such that the nail may be conveniently introduced prior to driving the point 29 through the bottom 21. The nail-expanded shoulder 31 in conjunction with flare 23 locks the bushing 15 to the sleeve 1 and also frictionally grips the nail 27. Hence the nail will remain in any axial position into which it is forced. Preferably, the axial position should be such that the head 33 is located at some distance from the flare 23.

In view of the above, it will be seen that the assembly of Fig. 4 is more or less rigid, the nail 27 being fairly tightly gripped by the lower end 31 of the bushing 15 and the bushing being held in the sleeve 1 by the flares 23 and 31. In other words, the sleeve, bushing and nail are held captive with respect to one another, as an assembly. The result is that the mounting of the assembly is convenient. Thus one hand may hold the sleeve 1 while the point 29 of the nail is placed on the surface 35 of a wooden support 37, for example. Then by hammering the nail head 33, the nail enters the wood, and the skirt 9

reaches a seat on the surface 35. Additional hammering drives the nail further into the wood through the bushing 15 until the head 33 resiliently engages the flare 23. The final hammer blows seat the flare 23 on the bevel 11, the resilience of the flare 23 preventing breakage of the usually frangible sleeve 1. An advantage of the assembly rigidity obtained, is that the nail 27 may be more accurately driven than if, as heretofore, it were loose in the sleeve opening such as 13. The wire to be mounted by the nailed insulator is attached at groove 3.

In Figs. 6 and 7 is shown a four part form of the invention in which the wire or wires to be mounted are clamped into position. In this case there are provided two insulating sleeves 39 and 41, the latter having a bottom skirt 43 providing a lower recess or socket 45 and having a hole 47 therethrough. Its upper surface is provided with two grooves 49 in which are wire-gripping serrations 51. The lower surface of the upper sleeve 39 is also provided with wire-gripping serrations 53. Its upper surface includes a bevel 55, terminating a hole 57 therethrough. In this case the cup-shaped bushing, numbered 59, is longer, so that when inserted through the openings 47 and 57 there will be space for relative movement thereon of the sleeves 39 and 41. After the bushing 59 is inserted into the sleeves 39 and 41, a nail 61 is inserted into the bottom 64 of the bushing, its point 63 driving through to form the expanded collar 65 and providing a frictional hold on the nail. The nail is left in a position with its head 67 spaced from the upper flare 69 of the bushing 59. This form of the invention is nailed up as shown in Fig. 7, wherein after the point 63 has entered the wood 71 to the fullest extent, the skirt 43 seats on the upper surface 73 of the wood. Then as the nail is driven down and the head 67 engages the flare 69, both the bushing 59 and the upper sleeve 39 are driven down until the sleeves 39 and 41 bite into and clamp on the insulated wires 75. The depth of the socket 45 is sufficient that the bottom enlargement 65 may move down as the nail head 67 takes its final resilient seat on the flare 69 located in the bevel 55.

It will be appreciated that although single-headed nails have been shown herein, double-headed nails may also be employed, i.e., those that will allow removal with a claw hammer.

The advantages of the invention flow from the ease with which the tough resilient tubular bushing may be inserted into the insulator sleeve or sleeves and then the nail inserted into the bushing and forced through its closed end, causing an expansion into the recess at the bottom of one insulator sleeve, thus creating an anchoring or retaining feature. Since the nail is held in the bushing by friction of the punctured portion of the bushing, the nail is also held in an advantageous position for driving it. The flared portion of the sleeve functions as a shock absorber for the nail head and hammer during final seating blows. The enlarged and flared portions of the bushings provide holding the bushing captive with the sleeve parts. Thus in both forms of the invention, the bushing provides three functions, namely, (1) adequate shock absorber action against blows from the hammer and nail head; (2) captive retention of the nail and the sleeve or

sleeves in advantageous positions for handling and driving; and (3) additional electrical insulation beyond that of the porcelain of the sleeve or sleeves. Function (3) is particularly effective in the case of the Figs. 6 and 7 form of the invention and in either form in case a porcelain sleeve should break after installation.

In view of the above, it will be seen that the several objects of the invention are achieved and other advantageous results attained.

As various changes could be made in the above constructions and methods without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

I claim:

1. An insulator assembly comprising a relatively frangible insulating sleeve means having an endwise recess and an axial hole communicating with said recess, a normally cup-shaped deformable bushing extending through said hole and having a first flare outside of the sleeve means opposite said recess, a nail extending through the bushing and having a head adjacent said first flare, the bottom of said cup-shaped bushing being located in said recess and being pierced and deformed by the nail and thereby expanded to form a second flare in said recess greater than the size of said hole, said flares holding the bushing captive in the sleeve means, the pierced bottom frictionally holding the nail in the bushing, with the head of the nail spaced from the second flare.

2. An insulator assembly comprising relatively frangible first and second sleeves, the second one of said sleeves having an endwise recess and an axial hole communicating with said recess, the first sleeve also having an axial hole, a normally cup-shaped deformable bushing extending through said holes and having a first flare outside of the first sleeve opposite said recess, a nail extending through the bushing and having a head adjacent said first flare, the bottom of said cup-shaped bushing being located in said recess of the second sleeve and being pierced and deformed by the nail to form a second flare in said recess greater than the size of said hole, thereby with the first flare to hold the bushing captive in the sleeves and frictionally to hold the nail in the bushing with the head of the nail spaced from said flare, the length of said bushing being sufficient to permit relative motions between the sleeves in their captive positions on the bushing, said sleeves having axially opposed wire-gripping surfaces adapted to be brought together by driving the nail through a supporting surface, said first flare cushioning the action of the nail head adjacent the first sleeve and the bushing being movable through the second sleeve to move the second flare in said recess when the nail is driven.

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