Sept. 7, 1937. W. T. JERVEY 2,092,515

INSULATOR

Filed Dec. 11, 1935 2 Sheets-Sheet 1

FIG. 1

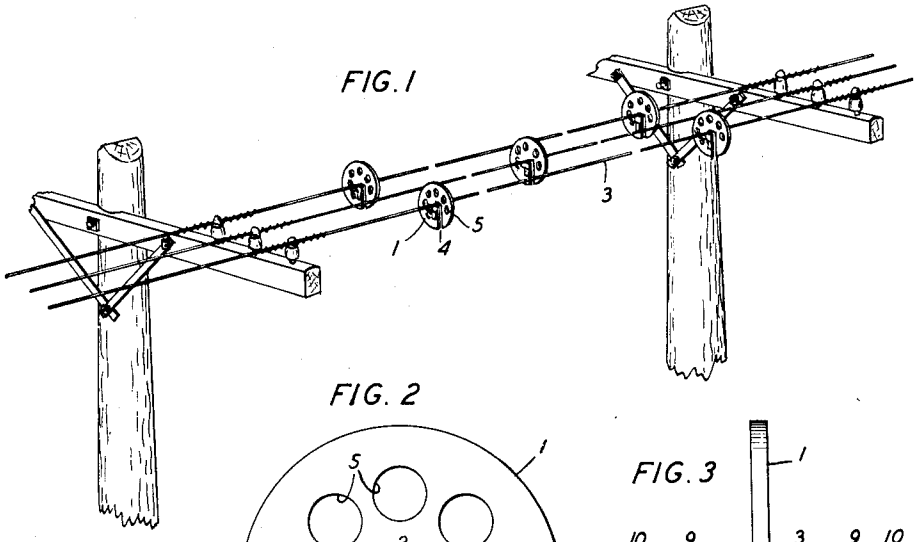


FIG. 2

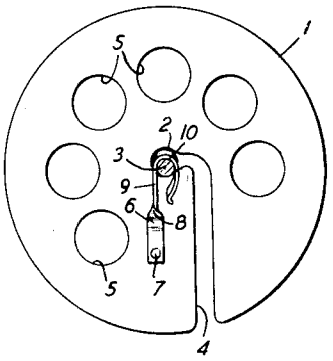


FIG. 3

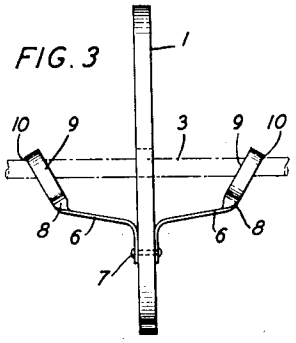


FIG. 4

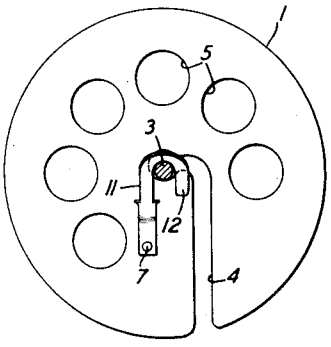


FIG. 5

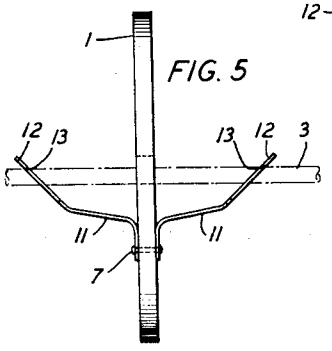


FIG. 6

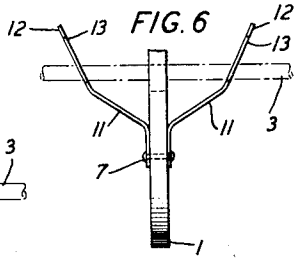


FIG. 7

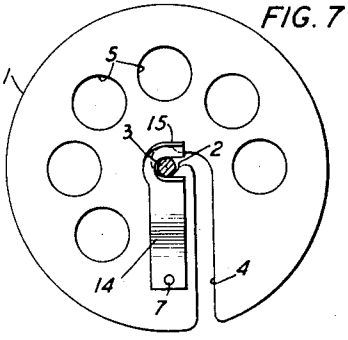


FIG. 8

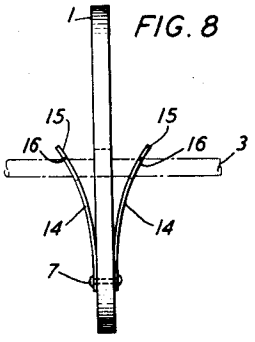
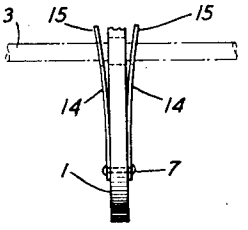


FIG. 9



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INSULATOR

Filed Dec. 11, 1935 2 Sheets-Sheet 2

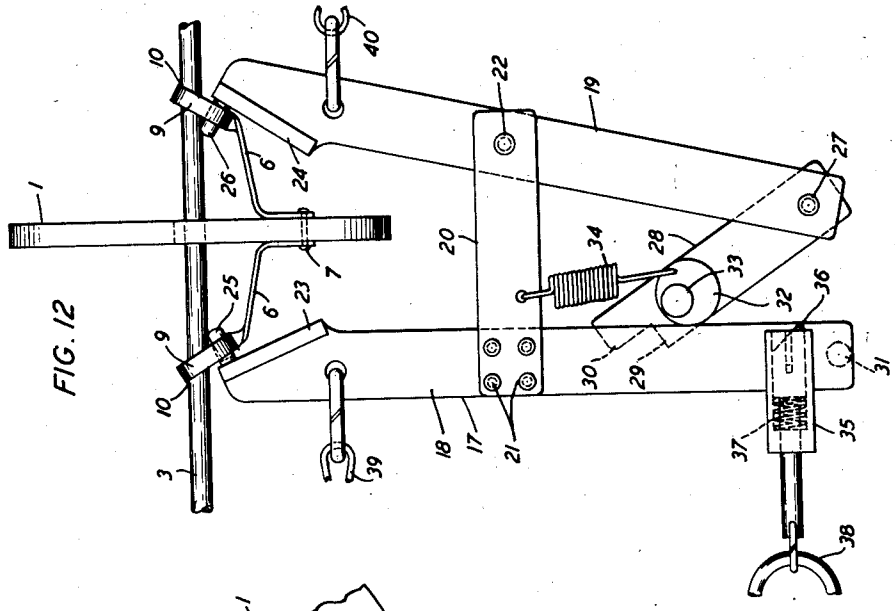

FIG. 12

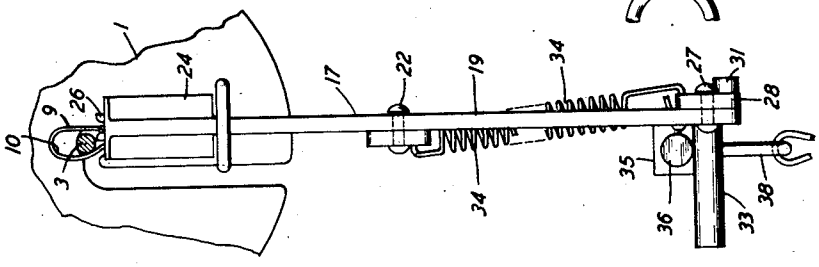

FIG. 11

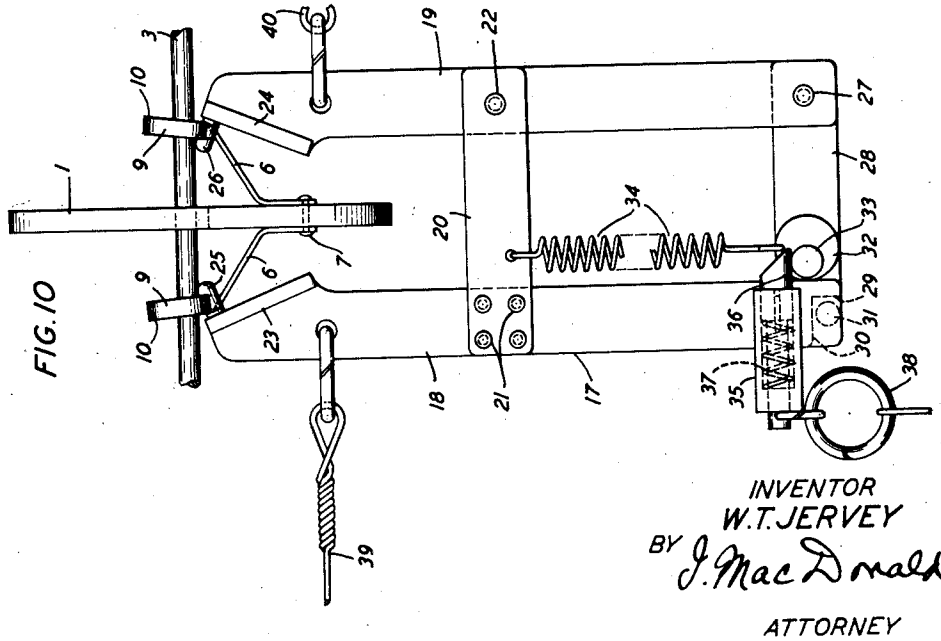

FIG. 10

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Patented Sept. 7, 1937

2,092,515

UNITED STATES PATENT OFFICE

2,092,515

INSULATOR

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Application December 11, 1935, Serial No. 53,939

7 Claims. (Cl. 173—251)

This invention relates to insulators and more particularly to insulators for line wires of electrical systems.

The object of this invention is to maintain the spacing of line wires at a predetermined minimum distance from line wires adjacent thereto.

A feature of this invention resides in the particular form and structure of an insulating member.

Another feature resides in holding means for holding the insulator in a required position.

In the drawings:

Fig. 1 shows a system of open-wire lines supported on poles and having the invention applied to the line wires;

Fig. 2 is a plan view of the insulator applied to a line wire, the line wire being shown in cross-section; the insulator and wire in Fig. 2 are shown enlarged relative to Fig. 1;

Fig. 3 is an edge view of the insulator applied to a line wire and viewed from the left of Fig. 2;

Fig. 4 is a plan view corresponding to Fig. 2 but including a modification of the holding means;

Fig. 5 is an edge view of the device shown in Fig. 4 and viewed from the left of Fig. 4;

Fig. 6 is a view corresponding to Fig. 5, showing a portion of Fig. 5 and with the holding means in a position released relative to the line wire;

Fig. 7 is a view corresponding to Figs. 2 and 4 but including a further modification of the invention;

Fig. 8 is an edge view of the structure shown in Fig. 7 and viewed from the left of Fig. 7;

Fig. 9 is a view corresponding to Fig. 8 but showing only a portion of Fig. 8 and with the holding means in a position released relative to the line wire;

Fig. 10 is a plan view of a towing device for adjusting the insulator to a required position on a line wire, the towing device being shown as engaging an insulator on a line wire preparatory to being used for towing the insulator to the position required;

Fig. 11 is an edge view of the apparatus shown in Fig. 10 and viewed from the right of Fig. 10; and

Fig. 12 is a plan view corresponding to Fig. 10 but showing the towing device releasing the holding means of the insulator.

In systems of open-wire lines of electrical communication systems it is necessary, where bare conductors are used as the line wires, to maintain the wires separated from each other. To prevent false signals it is also necessary to keep the wires spaced from each other by at least some predetermined distance.

The insulator shown in Fig. 2 is a round disc 1 of insulating material having a transversely extending aperture 2 in its diametrical center adapted to receive a line wire 3. The center of the aperture 2 is preferably slightly offset relative to the diametrical center of the disc 1. A slot 4 extending from the periphery of the disc 1 to the aperture 2 is provided to permit placement of the insulator on a line wire 3 without having to thread an end of the line wire through the aperture 2 in the disc 1. The slot 4 extends from the periphery of the disc 1 in a line offset from the aperture 2 to a point in a horizontal line with the aperture 2 from whence the slot 4 turns at about an angle of 90 degrees into the aperture 2. A plurality of comparatively large apertures 5 are provided in the disc 1. The apertures 5 may be arranged radially relative to the aperture 2 as shown in Fig. 2 or may be located at other points in the disc. The apertures 5 are provided in the disc 1 to reduce the wind resistance of the device and to provide openings through which gunshot pellets or other like missiles aimed at the device may pass without striking the insulator. The aperture 2 is preferably made somewhat larger in diameter than the line wire 3 and slightly larger in diameter than the width of the slot 4, the slot 4 being only of sufficient width to readily receive the line wire 3.

Attached to opposite faces of the disc 1 are holding arms 6—6. The arms 6—6 may be formed from sheet metal or other resilient material. The material employed, however, should be somewhat harder than the material of a line wire. One end of each arm 6 is secured to the disc 1 at a point about midway between the aperture 2 and the periphery of the disc 1. The means for securing the arms 6—6 to the disc 1 may be rivets 7—7 or like fastening means which pass through apertures in the arms 6—6 and transversely through the disc 1. The arms 6—6 spread outwardly, one from each flat surface of the disc, and extend slightly upward from the point of attachment. The arms are twisted at about an intermediate point 8 to present flat surfaces toward the line wire 3 as shown in Fig. 3. The free ends of the arms 6—6 continue upwardly from the point of twist 8 and continue to diverge from the flat surface of the disc 1 to a point slightly above the center of the aperture 2 where they are bent to form hooks 9—9 to hook over

the line wire 3. The hooks 9—9 are preferably in the form of a shepherd's crook.

In applying the device shown in Figs. 2 and 3 to a line wire is shown in Fig. 1 the insulator is hooked over a line wire 3 by placing the insulator over the line wire so that the slot 4 is in line with the wire. The insulator is then lowered about the line wire 3 till the line wire 3 is even with the free ends of the hooks 9—9. The hooks 9—9 are then manually slipped over the line wire 3 and the insulator is positioned so as to bring the line wire further within the hooks 9—9. By further pressing the insulator downwardly on the line wire 3 the portion of the wire passing through the disc 1 is brought into the horizontal portion of the slot 4 and is then pulled by the hooks 9—9 into the aperture 2. When the insulator is applied to the line wire 3 the plane of the disc 1 is perpendicular to the line wire 3.

When the arms 6—6 are in normal position as shown in Fig. 3 and the insulator has been applied to a line wire 3 the hooks 9—9 pass diagonally across the line wire 3 and the outer edges 10—10 of the hooks 9—9, where the hooks cross the line wire, bear against the upper surface of the line wire 3 with sufficient pressure to prevent the insulator from being moved longitudinally along the line wire. If the edges 10—10 of the hooks 9—9 are comparatively sharp and are harder than the material of the line wire 3 the upper surface of the line wire 3 will be slightly indented by the edges 10—10 of the hooks. The hooks 9—9 will then have sufficient grip on the line wire 3 to prevent movement of the insulator along the line wire. The arms 6—6, therefore, serve as holding means for the insulator and maintain the insulator in an adjusted position on the line wire 3. To move the insulator longitudinally along the line wire it is only necessary to press the arms 6—6 simultaneously toward the disc 1 and thereby draw the edges 10—10 of the hooks 9—9 from engagement with the line wire 3 and then slide the insulator to a required position. When the arms 6—6 are released they spring apart again and the edges 10—10 of the hooks 9—9 press against the line wire 3 with sufficient force to prevent movement of the insulator along the line wire.

With the insulators placed on the line wires 3 as shown in Fig. 1 the line wires 3 are prevented by means of the insulators from coming into contact with each other even though a comparatively high cross wind or other force may be tending to move the line wires. The insulator may be made of any required diameter to maintain the line wires separated from each other a predetermined minimum distance.

If line wires are equipped with insulators, of the type described, the poles supporting the line wires may be spaced a greater distance apart, or the line wires may be more closely spaced, than is normally the custom where such insulators are not provided.

In Figs. 4, 5, and 6 a modification of the invention is shown. In this case the holding means for the insulating disc 1 are resilient arms 11—11 attached to opposite faces of the disc 1 in the same manner as the arms 6—6 in Figs. 2 and 3. The arms 11—11 are substantially flat and terminate at their free ends in hooks 12—12. The hooks 12—12 diagonally cross the line wire 3 as shown in Fig. 5 and edgewise relative thereto. When the arms 11—11 are in normal position the edges 13—13 of the hooks 12—12 bear against the upper surface of the line wire 3 with sufficient force to prevent movement of the insulator longitudinally along the wire.

To adjust the insulator shown in Figs. 4, 5, and 6 along the line wire 3 it is only necessary to press the arms 11—11 toward the disc 1 sufficiently to move the edges 13—13 of the hooks 12—12 from binding engagement on the line wire 3. The insulator may then be slid along the line wire to a required position. When the arms 11—11 are released they will spring apart and bring the edges 13—13 against the line wire 3 to hold the insulator in the position to which it has been brought. In Fig. 6 the arms 11—11 are shown as pressed toward the disc 1 to release the edges 13—13 from engagement with the wire 3.

In Figs. 7, 8, and 9 another modification of the invention is shown. The disc 1 in these figures like the disc 1 in Figs. 4, 5, and 6 is identical with the disc 1 shown and described with reference to Figs. 2 and 3. In this case, however, the holding means for the insulator are curved spring arms 14—14 made of flat sheet resilient material. The spring arms 14—14 are attached at one end to opposite faces of the disc 1 by rivets 7—7 or other fastening means as in the other embodiments. The spring arms 14—14 are notched at their free ends to form hooks 15—15 to engage the line wire 3. The hooks 15—15 face the line wire 3. This arrangement permits bringing the line wire 3 upwardly through the slot 4 directly into the horizontal portion of the slot 4 and directly into the hooks 15—15. No manual pressing of the line wire 3 into the hooks is required with this device such as is required in connection with the structures shown in Figs. 2, 3, 4, 5, and 6. In the structure shown in Figs. 7, 8, and 9 the outer edges 16—16 of the hooks 15—15, when in normal position as shown in Fig. 8, press against the upper surface of the line wire 3 and engage the line wire 3 with sufficient pressure to maintain the insulator in a required position. To move the insulator along a line wire 3, longitudinally of the line wire, it is only necessary to press the spring arms 14—14 toward the disc 1 as shown in Fig. 9 sufficiently to move the edges 16—16 of the hooks 15—15 from engagement with the line wire and then slide the insulator to a required position. When the spring arms 14—14 are released they will spring apart to their normal position as shown in Fig. 8 and the edges 16—16 of the hooks 15—15 will engage the line wire 3 and hold the insulator in the adjusted position.

Figs. 10, 11, and 12 show a towing device 17 for moving insulators of the type described to a required position on a line wire 3. The towing device 17 is shown as being used in applying an insulator, constructed as shown in Figs. 2 and 3, to a line wire 3.

The towing device 17 comprises two spaced upright bars 18 and 19 held in spaced relation at about their central portions by means of a cross-bar 20. One end of the cross-bar 20 is rigidly secured to the upright bar 18 by the rivets 21 or other like fastening means. The upright bar 19 is centrally pivoted on the other end of the cross-bar 20 by means of a pin or rivet 22. The upper ends of the upright bars 18 and 19 serve as jaws to engage the insulator. The upper end of the upright bar 18 terminates in a flange forming a stationary jaw 23. The upper end of the upright bar 19 terminates in a flange forming a movable jaw 24. The jaws 23 and 24 are equipped with longitudinally split pins 25 and 26, respectively,

adapted to receive the upper portions of the arms 6 of the insulator.

Pivotally attached to the lower end of the arm 19 by a pin 27 is a holding bar 28. The free end of the holding bar 28 is cut away on the lower corner to provide a shoulder 29 and a reduced end portion 30 to engage a stud 31 secured to the rear surface of the bar 18. Attached to the front face of the holding bar 28 near its free end and adapted to engage the inner edge of the lower end of bar 18 is a circular disc 32. Projecting normal to the outer flat surface of the circular disc 32 and secured thereto in an eccentric position is a rod 33. The rod 33 is comparatively long and extends outwardly beyond the front surface of the bar 18. The free end of the holding bar 28 is normally held in a raised position by means of a spring 34 as shown in Fig. 12. The spring 34 is attached at its lower end to the holding bar 28 by having a hook on its lower end extending through an aperture in the disc 32 and through an aligned and corresponding aperture in the holding bar 28. The upper end of the spring is hooked through an aperture in the cross-bar 20. A latch 35 is secured to the lower end of the bar 18 to hold the holding bar 28 in a lowered position as shown in Fig. 10. The latch 35 has a spring pressed bolt 36 extending, when in projected position, beyond the inner edge of the lower portion of the bar 18 and in line with the top of the rod 33 when the holding bar 28 is swung downward to its lowermost position. The spring 37 in the latch 35 normally maintains the bolt 36 in projected position. The bolt 36, however, may be manually withdrawn against the spring 37 as shown in Fig. 12 by means of a chain 38.

When an insulator has been applied to a line wire 3, in the manner previously described, the towing device 17 may be attached to the insulator by placing the split pins 25 and 26 in engagement with the upper ends of the arms 6—6 as shown in Fig. 12. By manually pulling down the holding bar 28 from the position shown in Fig. 12 to the position shown in Fig. 10 and the consequent pressing of the circular disc 32 against the inner edge of the lower portion of the bar 18 the lower ends of the bars 18 and 19 are spread apart from the position shown in Fig. 12 to the position shown in Fig. 10. By the consequent movement inward of the upper end of the bar 19 the arms 6—6 of the insulator are pressed toward the disc 1 to a sufficient extent to remove the outer edges 10—10 of the hooks 9—9 from engagement with the line wire 3. The holding bar 28 when nearing its lowermost position brings the rod 33 into engagement with the sloping upper surface of the bolt 36 of the latch 35. As the holding bar 28 is moved further downward the latch bolt 36 is forced inwardly against its spring 37. Further downward movement of the holding bar 28 brings the rod 33 past the latch bolt 36 and brings the shoulder 29 and the reduced end 30 of the holding bar into engagement with the stud 31. The latch bolt 36 is then moved by its spring 37 to extend over the upper surface of the rod 33 to retain the holding bar 28 in its lowermost position. The holding bar 28 prevents opening of the jaws 23 and 24. With the towing device 17 clamped to the insulator and holding the outer edges 10—10 of the hooks 9—9 of the insulator from engaging the line wire 3, as shown in Figs. 10 and 11, the insulator may be pulled along the line wire. Tow lines 39 and 40 are respectively attached to the upper ends of the bars 18 and 19 to enable linemen to tow the device to a required position between supporting poles of a line wire system. When the insulator has been towed to a required position the latch bolt 36 may be manually withdrawn from engagement with the rod 33 by means of the pull chain 38. This action releases the holding bar 28 and permits the spring 34 to swing the holding bar upwardly on its pivot point as shown in Fig. 12. The spring pressure of the arms 6—6 of the insulator when in the position shown in Fig. 10 will propel the arms 6—6 outwardly from the flat surfaces of the disc 1 and bring the outer edges 10—10 of the hooks 9—9 into engagement with the line wire 3 to prevent further movement of the insulator along the line wire 3. The spring pressure in the arms 6—6 will also force the upper ends of the arms 18 and 19 further apart and permit some free swinging of the towing device 17. By alternate pulling on the tow lines 40 and 39 the towing device 17 may be dislodged from engagement with the insulator.

What is claimed is:

1. An insulator for a line wire comprising a centrally apertured disc of insulating material, the aperture being slightly larger than the diameter of the line wire, a slot of sufficient width in the disc to receive the line wire, said slot extending from the central aperture in the disc to the periphery of the disc, and serving as an opening to permit the line wire to be brought to extend transversely through the central portion of the disc, spring arms attached to the faces of said disc between the central aperture and the perimeter of said disc, said arms having free ends extending away from said disc and adapted to engage a line wire passing through the central aperture in said disc, hooks on the free ends of said arms and sharp edges on said hooks to engage the line wire said arms being bendable toward said disc to remove the hooks from engagement with the line wire.

2. An insulator for a line wire comprising a disc of insulating material, said disc having formed therein a central aperture and a slot extending from the perimeter of the disc to the central aperture, said slot and the central aperture serving as an opening to permit placement of said disc about the line wire so that the line wire will extend transversely through the central portion of said disc, spring arms attached to the flat faces of said disc, each of said arms having a free end extending away from the plane of the disc and to a point in line with the central aperture, a hook formed on the free end of each of said arms, each hook diagonally crossing the axial line of said disc and a sharp edge portion on each hook adapted to engage the line wire when the line wire extends through the central aperture in said disc, said arms being bendable toward said disc to remove the hooks from engagement with the line wire.

3. In an insulator for a line wire, an apertured disc of insulating material angularly slotted from its perimeter and apertured at its center to permit a line wire to be brought to the central portion of said disc, a pair of spring arms, said arms being attached to said disc at a point offset from the diametrical center of said disc and said arms extending outwardly of said disc and upwardly from the point of attachment to a line projected from the axis of said disc and hooked free ends on said arms adapted to hook over a line wire, said arms normally pressing their hooked free ends against the line

wire to retain the insulator against sliding movements along the line wire, but being flexible toward said disc to release their gripping action on the line wire to permit movement of the insulator along the line wire.

4. An insulator for a line wire comprising an apertured flat disc of insulating material angularly slotted from its perimeter and centrally apertured at the inner end of the slot to permit bringing of a line wire to the central portion of said disc, a pair of spring arms attached to said disc at a point intermediate the perimeter and the axis of said disc, free ends of said arms extending outwardly of the plane of said disc and upwardly from the point of attachment, each of said arms having a hooked free end diagonally crossing a line projected from the axis of said disc and normal to the plane of said disc, the hooked free ends of said arms having sharp side edge portions and said arms being each adapted to present a sharp side edge of the hooked free end against a line wire when the line wire extends through the central aperture in the disc, said arms normally serving to prevent sliding of the insulator along the line wire, but being flexible toward the faces of said disc to release the hooked free ends from engagement with the line wire to permit sliding of the insulator along the line wire to a required position.

5. An insulator for a line wire comprising an apertured flat disc of insulating material angularly slotted from its perimeter and centrally apertured at the inner end of the slot to permit the line wire to be brought transversely through the central portion of said disc, a pair of spring arms attached to said disc at a point intermediate the perimeter and the axis of said disc, free ends of said arms extending outwardly of the plane of said disc and upwardly from the point of attachment, each of said arms having a 90 degree twist at a point intermediate the ends of the arm and a hooked free end diagonally crossing a line projected from the axis of said disc and normal to the plane of said disc, the hooked free ends of said arms being each adapted to present an edge of the hooked free end against a line wire when the line wire extends through the central aperture in the disc and said arms being bendable toward said disc to release the hooked free ends from engagement with the line wire.

6. An insulator for a line wire comprising an apertured disc of insulating material angularly slotted from its perimeter and centrally apertured at the inner end of the slot to permit the line wire to be brought transversely through the central portion of said disc, a pair of flat spring arms attached to said disc at a point intermediate the perimeter and the axis of said disc, said arms being progressively curved upwardly and outwardly of the point of attachment and toward a line projected normal to the plane of said disc and from the axis and hooks on the free ends of said arms, said hooks following the curvature of said arms and normally presenting edge portions of the hooks against the line wire when the line wire extends through the insulator and said arms being bendable toward said disc to release the hooks from engagement with the line wire.

7. An insulator for line wires comprising a disc of insulating material centrally apertured to receive a line wire, an inverted L-shaped slot extending from the perimeter of the disc to the central aperture, the central aperture and said slot serving as an opening through which the line wire may be brought to extend transversely through the central portion of said disc; a pair of oppositely bowed spring arms attached to said disc at a point intermediate the perimeter and the axis of said disc, said arms curving upwardly and outwardly of the point of attachment to the axis line of said disc, and hooked free ends on said arms having their hooks facing against the direction taken by the upper end of said inverted L-shaped slot and disposed in planes offset from the plane of said disc.

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