Aug. 11, 1953 G. H. MANKE 2,648,796

BIRDPROOF SPARK GAP FOR DISTRIBUTION LINES

Filed Nov. 26, 1951 2 Sheets-Sheet 1

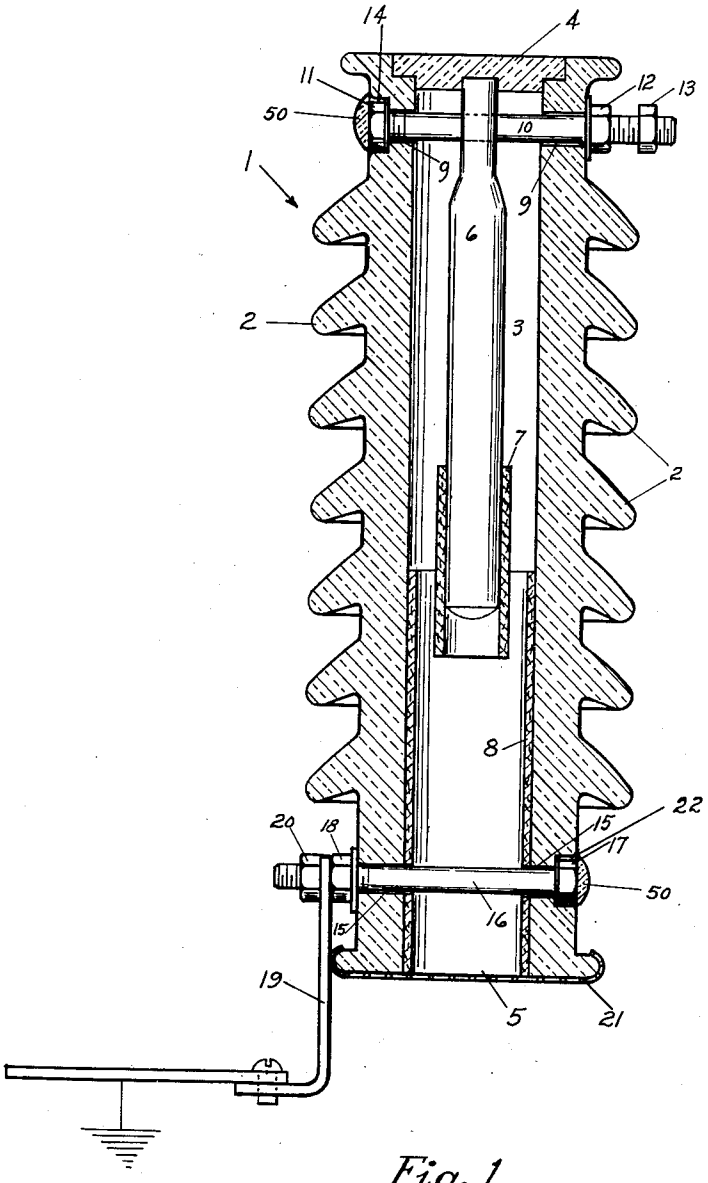


Fig. 1

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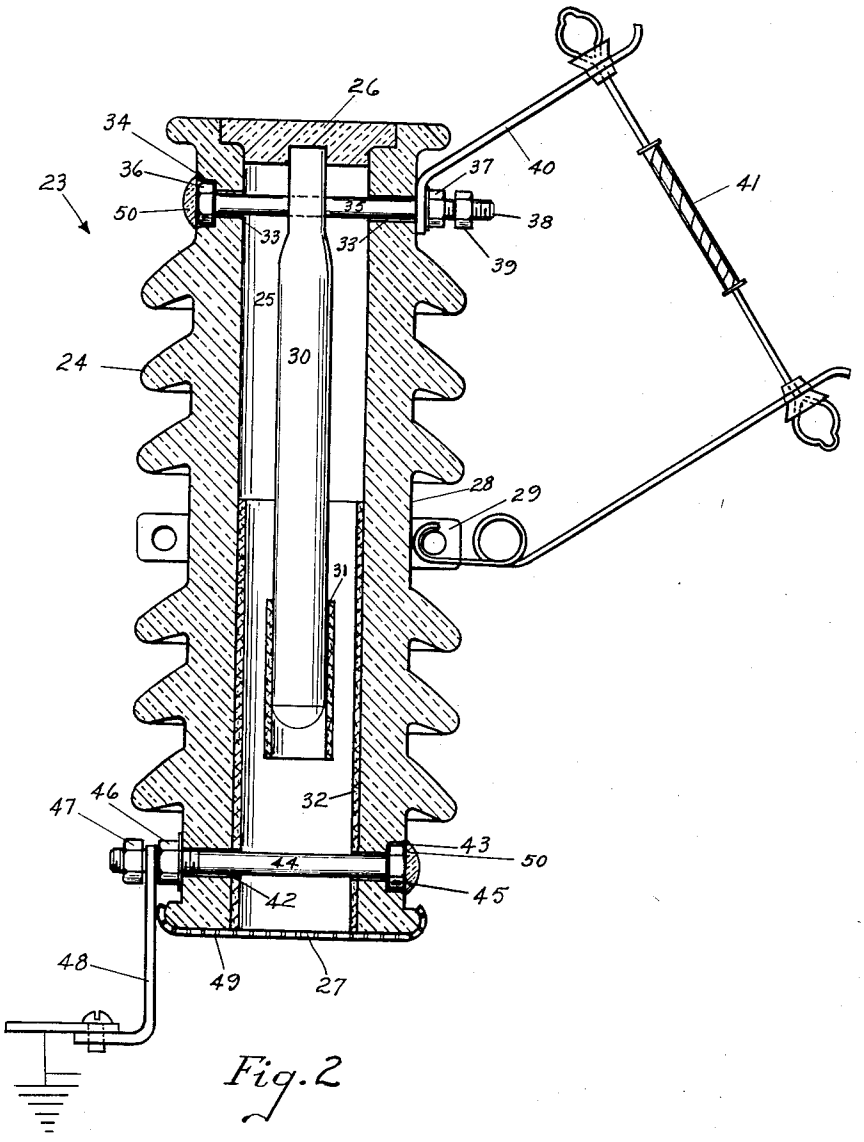


Fig. 2

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BIRDPROOF SPARK GAP FOR DISTRIBUTION LINES

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2 Claims. (Cl. 313—243)

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This invention relates to an improvement in spark gaps and in application provides a birdproof spark gap for electrical distribution lines.

Lightning arresters are devices that provide a weak spot in the insulation on an electric line, thus functioning as a safety valve to let off excess voltage. The lightning arrester consists of a gap which under normal conditions insulates the line voltage from the ground. When a lightning disturbance occurs on the line, the surge sparks over this gap and flows to the ground, thus diverting the high voltage away from transformers and/or other valuable equipment.

Spark gap arresters to which this invention relates do not extinguish the power follow arc which follows spark over from surge, but instead rely upon a fuse or recloser to interrupt the arc.

Double gap lightning arresters were devised to reduce the possibility of birds short circuiting the circuit. The probability that two birds would choose at the same time to light on the wires in such a position as to make a contact between two separate gaps, is considerably less than if one bird could complete and thusly establish a short circuit. However, to effectively use the double gap requires quite an expanse of porcelain insulation which, of course, adds considerably to the cost of construction. Further, double gaps are obviously not always foolproof.

Thus, the principal object of this invention is to provide a compact lightning arrester which possesses improved attributes of a double gap lightning arrester.

Another object of my invention is to provide a single gap lightning arrester in which the active gap is enclosed in a housing made of porcelain or other insulating material.

A further object is to provide a lightning arrester which birds and/or rodents cannot short circuit.

Still another object of my invention is to place a fibre tube circumferentially around the end portion of the electrode and extending slightly beyond it to direct the spark from the electrode toward the bottom opening in the housing.

Other objects will appear from time to time in the course of the specification and claims.

I illustrate my invention more or less symbolically in the accompanying drawings, in which:

Fig. 1 is a sectional view of my spark gap.

Fig. 2 is a sectional view of a second form of this spark gap with a fuse connection on the outside of the porcelain housing.

Like parts are indicated by like reference characters throughout.

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I illustrate two embodiments of my invention. The one shown in Fig. 1 is a simple spark gap. The one shown in Fig. 2 has a fuse attachment to be used to protect a transformer when such is necessary or when unit construction of a fuse and lightning arrester is desirable.

Referring to Fig. 1, my spark gap comprises a housing 1 with skirts 2 extending along its outer side and a core 3 extending through the middle portion. At the upper end of the housing 1 is an insulating plug 4 and at the lower end of the housing, the core is open at 5. Inserted into the insulating plug 4 is an electrode 6 extending downwardly through the middle portion of the core 3. At the lower end of the electrode 6 surrounding it circumferentially and extending somewhat beyond the tip of the electrode 6 is a fibre tube 7 which serves to direct the spark toward the opening 5 at the bottom of the core. A fibre lining 8 lines the core 3 in its lower portion extending upwardly in this core a sufficient distance to direct the arc away from the porcelain wall so as to protect it from damaging sparks or gases.

Near the upper end of the housing 1 is a transverse opening 9 through which a conductor bolt 10 is inserted, passing through the electrode 6 and fastened by nut 12 on the outer side of the housing. A second nut 13 beyond the nut 12 forms a means of making a connection with the electrical distributing line when a wire connection from the line is placed between the two nuts and the outer nut 13 screwed toward the nut 12 until the wire is held in a tightened position between the nuts. The transverse opening 9 on the opposite side of the housing 1 from the line connection has a larger bore portion 14 to accommodate the bolt head 11 within the circumference of the housing 1. The bolt head 11 is then covered with an insulating compound 50 so that it is inaccessible to birds or rodents.

In reverse similar manner at the lower end of the housing 1 is a transverse opening 15 through which a bolt 16 is inserted and secured to the housing 1 by means of the nut 18 in threaded association with the bolt 16. On the side of the housing opposite the line connection is a grounding connection 19 attached to the bolt 16 by means of a nut 20 which clamps the grounding connection 19 in tightened position to the nut 18. A screen 21 extends over the core opening 5 at the lower end and is bent around the outer edges of the housing 1. The transverse opening 15 on the opposite side of the housing 1 from the ground connection has a larger bore portion 22 to accommodate the bolt head 17 within the circumference

of the housing 1. The bolt head 17 is then covered with an insulating compound 50 so that it is inaccessible to birds or rodents.

Referring to Fig. 2 I illustrate a porcelain housing 23 consisting of a series of skirts 24 on the exterior side of the housing and a cylindrical core 25 extending the length of the housing 23 through the central portion. The upper opening of this core 25 is closed by an insulating plug 26 and the opening 27 at the lower end of the core 25 is left open. Midway on the exterior of the porcelain housing 23 is a straight section 28 that provides a space where a fuse clamping device 29 can be secured. Inserted in the plug 26 and extending downwardly in the core 25 in a conducting electrode 30. Surrounding the circumference of the lower end of the electrode 30 is a fibre tube 31 that extends slightly beyond the tip of the electrode 30. Another fibre tube 32 serves as a protective lining for the porcelain core 25 in the lower half of the housing 23.

Near the upper end of the housing 23 is a transverse opening 33 with an enlarged bore portion 34 at one end. A conductor bolt 35 is inserted through the transverse opening 33 to make contact with the electrode 30. This conductor bolt 35 is fastened to the housing 23 by a nut 36 in threaded association with the bolt 35. The conductor bolt head is recessed in the enlarged bore 34 and is covered with an insulating compound 50 to make it inaccessible to birds and rodents. The opposite end 38 of the conductor 35 provides a means for connection to the line between the nuts 37 and 39, and also a means for attaching a standard fuse support 40. The fuse support 40 holds the fuse link 41 in suspended position between the electrical terminals. The fuse support 40 and fuse link 41 is a standard attachment that can be used in combination with my spark gap when it is desired to utilize the advantages of unit construction of a fuse and lightning arrester combination.

At the lower end of the housing 23 is a transverse opening 42 with an enlarged bore 43 at one end through which a bolt 44 is inserted and secured by bolt head 45 and nut 46 in threaded association, the bolt head covered with an insulating compound 50 to make it inaccessible to birds and rodents. On the opposite side of the housing from the fuse 41 the two nuts 46 and 47 on the outer end of the bolt 44 serve as a means for attaching a ground connection 48.

Over the lower opening 27 of the housing 23 and extending over the housing 23 is a wire mesh 49 which prevents insects from entering the housing core.

In the embodiment of my invention shown in Fig. 2 when an electrical surge occurs, it will travel through the conductor 35 to the electrode 30. The spark off the lower end of the electrode 30 is directed downwardly by the fibre tube 31 surrounding circumferentially the lower end of the electrode 30 to the conductor 44 and from there is carried to ground by some grounding means 48. The grounding means 48 is secured by the nuts 46 and 47 to the conductor 44 on the opposite side of the housing from the fuse link 41 so that birds or rodents cannot perch on the lower grounding conductor and reach the line terminal on the opposite side.

In the embodiment shown in Fig. 1, the spark gap without the fuse link, the surge is grounded in similar manner as in Fig. 2. The conductor 10 carries the surge to the electrode 6 from where the spark is directed downwardly by the fibre tube 7 until it sparks over to the conductor 16 which grounds it through the grounding connection 19. In both Figs. 1 and 2 the fibre lining 8 and 32 directs the arc away from the walls of the porcelain tube and thus protects the porcelain from deterioration. In this manner, a conducting or partially conducting surface is not formed which would obviate its usefulness.

Thereby, it can be seen that my improved bird proof lightning arrester provides a way of grounding dangerous surges on the line and is designed so that birds or squirrels cannot short circuit it.

I claim:

1. An excess-voltage protective device comprising an insulating housing having a cylindrical core extending through its length, an insulating closure at the upper end of the core, a lead-in line at the upper end with an electrode attached and extending downwardly in the core, a fibre tube circumferentially surrounding the end of the electrode and extending slightly beyond it, said fibre tube embracing said electrode in tight relationship so as to preclude the passage of gases between said electrode and said fibre tube, another fibre tube lining the cylindrical core of the housing in that area where an over-voltage spark might occur, said fibre tube lining extending beyond the tip of said electrode, a screen over the opening at the lower end of the housing, and a grounding means at the lower end.

2. An excess-voltage protective device comprising an insulating housing having a cylindrical core extending through its length, an insulating closure at the upper end of the core, a lead-in line at the upper end with an electrode attached and extending downwardly in the core, a fibre tube circumferentially surrounding the end of the electrode and extending slightly beyond it, said fibre tube embracing said electrode in close relationship so as to preclude the passage of gas therebetween, another fibre tube lining the cylindrical core of the housing in that area where an over-voltage spark might occur, said fibre tube extending beyond the end of said electrode, a screen over the opening at the lower end of the housing, and a grounding means at the lower end on the opposite side of the housing from the lead-in connection.

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