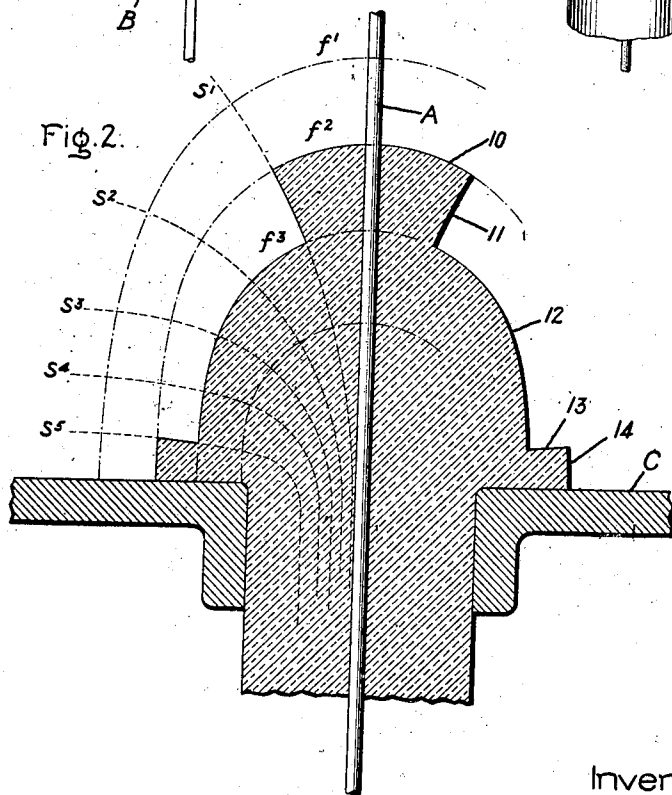
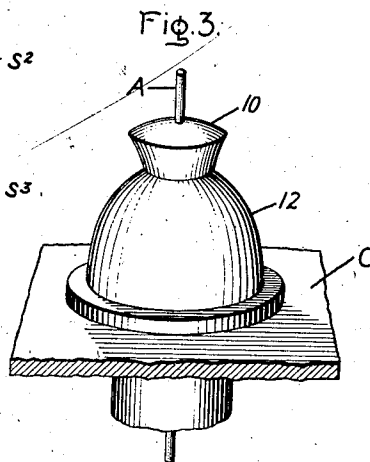
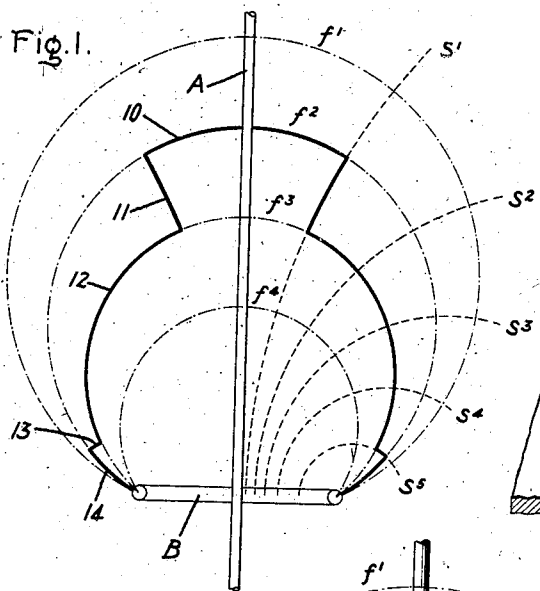


1,295,464.

Patented Feb. 25, 1919.



Inventor:
 Giuseppe Faccioli,
 by *Alfred Davis*
 His Attorney.

UNITED STATES PATENT OFFICE.

GIUSEPPE FACCIOLI, OF PITTSFIELD, MASSACHUSETTS, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

GRADED INSULATION.

1,295,464.

Specification of Letters Patent.

Patented Feb. 25, 1919.

Application filed January 2, 1917. Serial No. 140,074.

To all whom it may concern:

Be it known that I, GIUSEPPE FACCIOLI, a citizen of the United States, residing at Pittsfield, in the county of Berkshire, State of Massachusetts, have invented certain new and useful Improvements in Graded Insulations, of which the following is a specification.

My invention relates to graded insulation for terminals and has for its object a principle of design by which the insulating material is concentrated at certain points and omitted at others without impairing the insulating qualities.

In designing insulators, two problems are constantly to be solved, namely, providing creepage and the puncture resisting qualities of the dielectric employed, in suitable amount. The puncture resisting quality of an insulator is generally determined by the thickness provided, while the creeping quality is determined by the length of the path, electrically, from the conductor to ground.

It has been proposed to design insulators having the contour of an electrostatic line of force, or flux, in order to avoid the bending or refraction of the lines, thereby providing the desired creepage properties without corona losses, but I propose to distribute the insulating material in such a manner as to follow a plurality of electrostatic lines of different potential gradients and equipotential surfaces, thereby providing a similar but more desirable path for creepage, having different values and reducing the amount of insulating material employed without impairing the puncture-proof qualities.

My invention has thus greatly facilitated the design of insulating terminals of a desired capacity by reducing both the cost and material formerly required.

For a more exact understanding of my invention, reference may be had to the accompanying drawings, in which Figure 1 is a diagrammatic view illustrating the principle upon which my invention is based; Fig. 2 is a vertical section of a terminal insulator designed in accordance with my invention, while Fig. 3 is a perspective view thereof.

Referring now particularly to Fig. 1 of the drawing, reference character A denotes a conductor passing centrally through the grounded ring B.

The charge distributed along conductor A

will induce a charge on ring B, in accordance with the well known laws of electrostatics, so that if we should plot the lines of force, or dielectric strain connecting these charges, they would be distributed somewhat as indicated at f^1, f^2, f^3 , etc.

Knowing the distribution of the electrostatic lines of force or flux, equipotential surfaces may then be drawn in, their location being determined either experimentally or analytically, since these surfaces are known to be orthogonal trajectories of the lines of force. In the drawing I have indicated conveniently located equipotential surfaces at S^1, S^2, S^3 , etc.

As formerly practised, a terminal insulator would be designed by making its contour conform to a line of force, say the one indicated at f^2 in Fig. 1, but as already indicated, I cut out a portion of the insulating material lying along this line of force upon lines or surfaces of no potential difference, such as indicated at 11 and 13 along the equipotential surfaces S^1 and S^5 .

I cut the material away from the central portion so as to leave concentrated portions near the conductor A and ring B, as indicated at 10 and 14 in the drawing. The modified contour which I employ thus lies along a plurality of lines of force or flux, as indicated at 10, 12 and 14 and along the equipotential surfaces at 11 and 13. This modified contour saves material without weakening the puncture-proof qualities of the insulator.

In designing a terminal insulator adapted to fit in the cover C (Fig. 2) of some electrical apparatus, the lines of force or electrostatic flux passing from the conductor A (leading into the casing) to the cover C have a slightly different distribution from that indicated in Fig. 1, where the induced charge is on a ring. The induced charge is found to be distributed over the cover C, so that the lines of force have the distribution indicated at f^1, f^2, f^3 , etc., in Fig. 2.

When convenient, equipotential surfaces are drawn, as indicated at S^1, S^2, S^3 , etc. The contour of the insulator may then be readily developed in accordance with the principle of my invention. In the instance shown, I have concentrated insulation at 10 and 14 along line f^2 , cutting away the central portion along surfaces S^1 and S^5 , as at 11 and 13, so that a portion of the contour follows

line f^3 , as indicated at 12, all as suggested by the outline in Fig. 1.

While I have described in detail the best form at present known to me for carrying into effect an embodiment of my invention in compliance with the patent statutes, I would have it understood that I do not mean to be limited thereby in the choice of equivalents or the embodiment of means to an end, except as defined in my claims hereunto annexed.

What I claim as new, and desire to secure by Letters Patent of the United States is:—

1. A terminal insulator for electrical conductors having its external contour lying in the field of force of a plurality of electrostatic lines of different potential gradients and a plurality of equipotential surfaces having different values.

2. A terminal insulator for electrical conductors having its external contour adapted to lie along electrostatic lines of force of different potential gradients, said insulator having an intermediate portion of its surface cut away.

3. A graded insulator of the kind described having concentrated portions adapted to lie adjacent to electric conductors and the contour thereof lying along a plurality

of electrostatic lines of force having different potential gradients and their conjugate equipotential surfaces.

4. The combination with a cover, of a conductor adapted to pass therethrough and of an insulator having concentrated portions lying adjacent to said cover and conductor and the contour of its surface lying along a plurality of electrostatic lines of force of different potential gradients and equipotential surfaces having different values.

5. A terminal insulator having its exterior contour shaped to conform with a plurality of the equipotential surfaces corresponding in value to a plurality of electrostatic strains to which the said insulator is subject.

6. A terminal insulator for electrical conductors having its general contour defined by a system of electrostatic lines, having a constant potential gradient, a portion of its surface being cut away along surfaces which conform with two equipotential surfaces of different value and a surface defined by a system of electrostatic lines different from the first system.

In witness whereof, I have hereunto set my hand this 27th day of Dec., 1916.

GIUSEPPE FACCIOLI.

Corrections in Letters Patent No. 1,295,464.

It is hereby certified that in Letters Patent No. 1,295,464, granted February 25, 1919, upon the application of Giuseppe Faccioli, of Pittsfield, Massachusetts, for an improvement in "Graded Insulations," errors appear in the printed specification requiring correction as follows: Page 1, line 33, after the word "surfaces" insert the words *having different values*; same page, line 35, strike out the words "having different values;" and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 8th day of April, A. D., 1919.

[SEAL.]

Cl. 173—318.

F. W. H. CLAY,

Acting Commissioner of Patents.