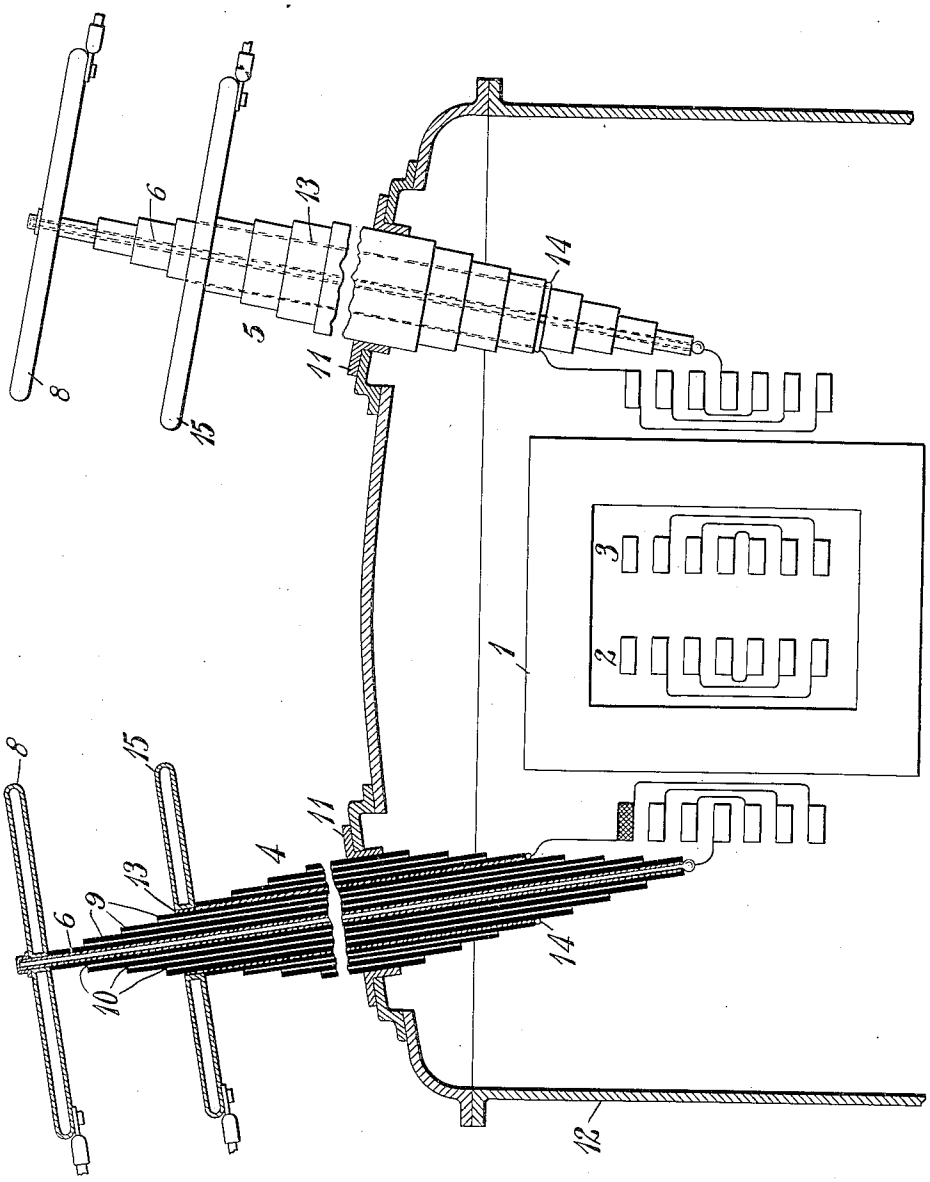
C. LE G. FORTESCUE.

TERMINAL FOR ELECTRICAL APPARATUS.

APPLICATION FILED AUG. 7, 1911.

1,129,467.

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WITNESSES:

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TERMINAL FOR ELECTRICAL APPARATUS.

1,129,467. Specification of Letters Patent. Patented Feb. 23, 1915.

Application filed August 7, 1911. Serial No. 642,878.

To all whom it may concern:

Be it known that I, CHARLES LE G. FORTESCUE, a subject of the King of Great Britain, and a resident of Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Terminals for Electrical Apparatus, of which the following is a specification.

My invention relates to electrical apparatus, and it has special reference to high potential terminal or outlet structures which are adapted for insulating high voltage conductors.

My invention is particularly adapted for use in very high voltage transformers provided with accessible taps, such as testing transformers.

The object of my invention is to provide a terminal structure of the class indicated by means of which a plurality of circuit connections may be readily effected, while a minimum number of bushings are used for the high potential conductors. For example, high voltage windings of testing transformers are frequently provided with taps, or made in a plurality of distinct parts, the terminals of the windings being usually brought out through separate bushings in order to permit the sections of the windings to be connected either in series or in multiple, or to distinct circuits, or to permit any one of the terminals to be connected to ground as desired.

To illustrate my present invention, I provide a transformer of this character having only two high-potential terminal bushings, but the structure of these bushings is such as to accommodate all four of the high-potential leads.

The single figure of the accompanying drawing is a diagrammatic sectional view showing the circuit connections and the terminal structure of a transformer constructed in accordance with my invention.

Referring to the drawing, the transformer here shown comprises a core member 1 having a high-potential winding divided into sections 2 and 3, and terminal bushings 4 and 5. The terminal bushings 4 and 5 are structurally alike, and the terminal 4, shown in section, will be described in detail. This terminal comprises an inner tube 6 of conducting material which terminates at its lower end in a sphere and is provided at its upper end with a metal disk 8 and is surrounded by a plurality of alternate layers 9 and 10 of insulating and conducting material. The outer layers are of gradually decreasing length, so that a stepped tubular structure of well known form is produced.

The bushing is supported by a collar 11 which is secured to the cover of a tank or casing 12, in which the transformer is located.

For an intermediate conducting layer of the bushing is substituted a metal tube 13 which is concentric with the tube 6 and terminates, at its lower end, in a ring 14 and is provided at its upper end with a disk 15 which is similar to the disk 8 but is materially spaced from it.

The inner ends of the conducting tubes 6 and 13 are connected to the respective terminals of the winding section 2, the winding section 3 being similarly connected to corresponding elements of the bushing 5. By properly interconnecting conducting members 8 and 15 of the bushings 4 and 5, the winding sections 2 and 3 may be connected in series or in multiple circuit relation, as desired. For example: One end of the one winding section may be connected to ground, the opposite end of said section be connected to the corresponding end of the other section and the remaining terminal connected to a high-potential source of alternating currents, in fact, various combinations, such as are frequently required for testing transformers, may readily be effected.

As fully disclosed in my patent application, Serial No. 642,877, discoidal bodies, such as 8 and 15, are disposed upon the outer ends of high potential conductors as 6 and 13, respectively, in order to distribute the electrostatic fields external to insulating bushings, such as 4 and 5, and thereby subject the surfaces of the bushings to substantially uniform electrostatic stresses.

I have found that, by providing a plurality of discoidal bodies 8 and 15, and connecting them to conductors disposed in the common insulating bushing 4, the electrostatic fields extending between the discoidal body 8 and the cover of the transformer tank is substantially independent of the electrostatic field extending between the discoidal body 15 and said cover of transformer casing 12. By properly disposing

the discoidal body 15 relative to the discoidal body 8 with which it should preferably conform in shape, the uniformity of distribution of the electrostatic field existing between said discoidal bodies and the top of the transformer casing is not disturbed. It is preferable that the surfaces of the discoidal bodies 8 and 15 presented to the main portion of the electrostatic field be substantially parallel. For extremely high voltage service, the dimensions of the laterally extending surfaces of the disks should be substantially large in comparison to the radius of curvature of their edges, in order to relieve electrostatic stresses in the air at the top portions of each disk, and also to redirect the electrostatic field adjacent to the surface of the bushing 4 so that it will be subjected to substantially uniform electrostatic stresses.

It will be understood that a plurality of similar disks, such as 8 and 15, may be superposed upon one another, and so arranged as to effect a substantially uniform distribution of the stresses upon the insulator 4.

Variations in size and arrangement of parts may be effected within the spirit and scope of my invention.

I claim as my invention:

1. The combination with a high-potential outlet comprising a plurality of concentrically disposed conductors of unequal lengths, a bushing therefor composed of alternate layers of insulating and conducting materials, and a conducting member embracing said bushing intermediate its ends, of conducting bodies extending laterally from the conductors, the portion of said bushing extending between the conducting member and said conducting bodies being substantially in the form of a truncated cone.

2. A terminal structure comprising alternate layers of insulating and conducting materials, the conducting layers serving as condenser elements, and a plurality of conducting bodies having rounded edges and being respectively connected to certain of the conducting layers and extending laterally from the bushing sufficiently to cause a substantially uniform distribution of the static field upon the exposed surfaces of the bushing.

3. A terminal structure comprising alternate layers of insulating and conducting materials, the conducting layers serving as condenser elements and certain of them having their potentials determined otherwise than by condenser action, and a plurality of conducting bodies having rounded edges and being respectively connected to the layers the potentials of which are determined otherwise than by condenser action, the said conducting bodies extending laterally from the bushing sufficiently to cause a substantially uniform distribution of the static field upon the exposed surfaces of the bushing.

In testimony whereof, I have hereunto subscribed my name this 31st day of July, 1911.

CHARLES LE G. FORTESCUE.

Witnesses:
R. J. DEARBORN,
B. B. HINES.