

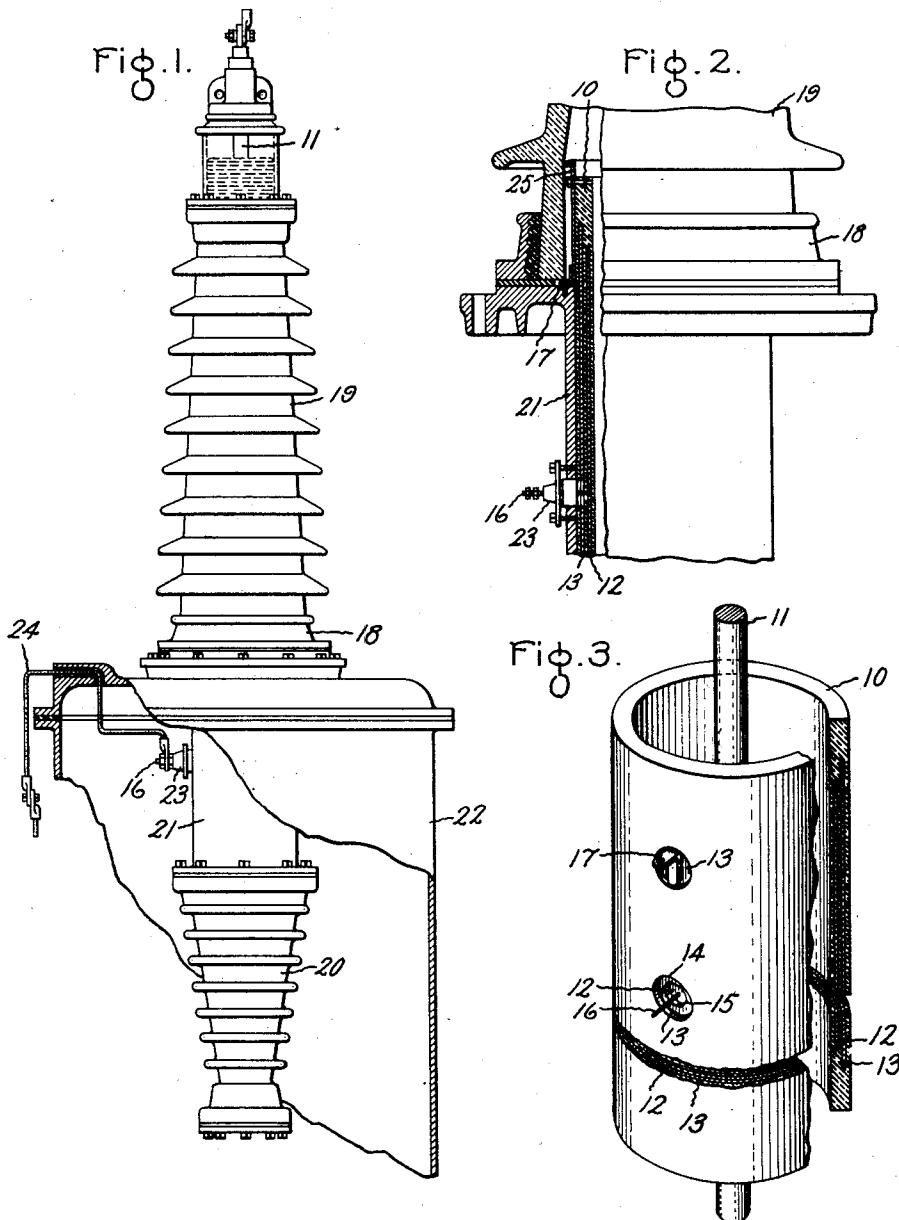
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E. D. EBY

CAPACITANCE TRANSFORMER

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UNITED STATES PATENT OFFICE.

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CAPACITANCE TRANSFORMER.

Application filed May 27, 1927. Serial No. 194,802.

My invention relates to capacitance or electrostatic transformer. Some electrical instruments and apparatus such as electrostatic measuring instruments may be operated with very little current. It sometimes happens, however, that the voltage of any available source of current is too high and must be transformed to a lower value for direct application to the instruments or apparatus. The voltage of the available source of current may be as high as a hundred thousand or two hundred thousand or more while the voltage desired for operating the instrument or apparatus may be very low, perhaps only fifty volts or so. Thus, the ratio of voltage transformation desired may be as high as two thousand or more to one. Instrument or current transformers of the usual type and having the necessary degree of accuracy for this purpose and under these conditions would be very expensive and the general object of the invention is to provide an improved capacitance transformer which may have a very high voltage transformation ratio and which shall be accurate, simple in construction and inexpensive.

The invention will be better understood from the following description taken in connection with the accompanying drawing in which Fig. 1 shows a convenient and efficient form of apparatus embodying the invention; Fig. 2 a detail, partly in section, of the apparatus shown in Fig. 1; and Fig. 3 a perspective view, also partly in section.

Like reference characters indicate similar parts in the different figures of the drawing.

In the particular form of the invention illustrated in the drawing, a cylinder 10 of insulating material surrounds concentrically a high tension conductor 11. Two concentric conductive cylindrical layers 12 and 13 are embedded in and supported by the insulating cylinder 10. This insulating cylinder 10 may be conveniently formed by winding a sheet of paper on a temporary cylindrical form, the paper being impregnated with a suitable insulating compound. Two conductive metallic sheets may be wound in with the paper to form the conductive layers 12 and 13.

After the cylinder 10 with its two conductive layers or cylinders 12 and 13 is formed, a small opening 14 is formed through the outer portion of the insulating cylinder and

through the outer conductive cylinder 13, thus exposing the insulation between the two conductive cylinders. A smaller opening 15 is then formed through this intermediate insulation to expose the inner conductive cylinder 12 to which a terminal 16 is connected by soldering, this terminal 16 being brought out through the opening in the outer conductive cylinder 13. A second terminal 17 is connected to the outer conductive cylinder through an opening in the outer portion of the cylinder 10.

The cylinder 10 may be supported concentrically about the high tension conductor 11 in any suitable way. One convenient arrangement is shown in Figs. 1 and 2 where the cylinder 10 is built into a high tension bushing 18 of the usual oil filled type. The bushing 18 comprises outer and inner insulating sections, 19 and 20 respectively, connected by an intermediate metal sleeve 21 which is mounted in the cover of a casing 22. The casing 22 is adapted to contain a body of insulating oil in which the lower or inner end of the bushing 18 may be immersed.

The terminal 17 of the outer conductive cylinder 13 is connected to the metal sleeve 21 and through this to the casing 22 which may be grounded. The terminal 16 of the inner conductive cylinder 12 is carried in a small bushing 23 through the sleeve 21 whence a conductor 24 is carried through a sealed opening in the casing 22 to a convenient point outside the casing.

The two capacities between the high tension conductor 11 and the inner conductive cylinder 12 and between the two conductive cylinders 12 and 13 are in series so that the voltage between the high tension conductor 11 and the outer conductive cylinder 13 will divide inversely as the values of the two capacities. Thus, if the two conductive cylinders 12 and 13 are very close together so that the capacity between them is very large as compared with the capacity between the high tension conductor 11 and the inner conductive cylinder 12, then the voltage between the terminal 16 and the casing 22 or ground will be very small as compared with the voltage of the high tension conductor 11.

The outer or grounded conductive cylinder 13 is longer than the inner cylinder 12 and extends beyond it at each end so that the inner cylinder 12 is shielded from outside disturbances. The sleeve 21 may in-

clude an extension 25 at each end projecting beyond the adjacent ends of the two conductive cylinders 12 and 13 to shield still further these cylinders from outside disturbances. This assures a practically constant ratio between the voltages to ground of the high tension conductor 11 and the inner conductive cylinder 12.

By bringing out the terminal 16 of the inner conductive cylinder 12 through an opening in the outer cylinder 13 and between the ends of the latter, distortion of the electrostatic field at the ends of these cylinders is avoided and the possibility of arcing and breakdown of insulation is reduced.

The invention provides a very simple and accurate arrangement for producing a very high ratio of voltage transformation where the secondary load is small. It has been described and illustrated in what is now believed to be its preferred form, but it will be apparent that various changes may be made without departing from the scope of the invention as defined in the appended claims.

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

1. A capacitance transformer including a high tension conductor, and two conductive cylinders spaced concentrically about said conductor, the outer cylinder being connected to ground and extending beyond said inner cylinder at each end.

2. A capacitance transformer including a high tension conductor, and two conductive cylinders spaced concentrically about said conductor, the outer cylinder being connected to ground, and the inner cylinder being provided with a terminal extending through said outer cylinder between its ends.

3. A capacitance transformer including a high tension conductor, and two conductive cylinders spaced concentrically about said conductor, the outer cylinder being connected to ground and extending beyond said inner cylinder at each end, and the inner cylinder

being provided with a terminal extending through said outer cylinder between its ends.

4. A capacitance transformer including a high tension conductor, a bushing surrounding said conductor and comprising a grounded conductive sleeve, and two conductive cylinders within said sleeve and spaced concentrically about said conductor, the outer of said cylinders being connected to said sleeve, and said sleeve being extended beyond said cylinders at each end.

5. A capacitance transformer including a high tension conductor, a bushing surrounding said conductor and comprising a grounded conductive sleeve, and two conductive cylinders within said sleeve and spaced concentrically about said conductor, the outer of said cylinders being connected to said sleeve, and the inner of said cylinders being provided with a terminal extending through said outer cylinder and said sleeve between their ends.

6. An insulating cylinder adapted to surround a high tension conductor, said cylinder supporting two conductive cylinders, the outer of said conductive cylinders extending beyond the inner one at each end.

7. An insulating cylinder adapted to surround a high tension conductor, said cylinder supporting two conductive cylinders, the inner of said conductive cylinders being provided with a terminal extending through the outer conductive cylinder between its ends.

8. An insulating cylinder adapted to surround a high tension conductor, said cylinder supporting two conductive cylinders, the outer of said conductive cylinders extending beyond the inner one at each end, and the inner of said conductive cylinders being provided with a terminal extending through the outer conductive cylinder between its ends.

In witness whereof, I have hereunto set my hand this 25th day of May, 1927.

EUGENE D. EBY