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HIGH TENSION CURRENT TRANSFORMER

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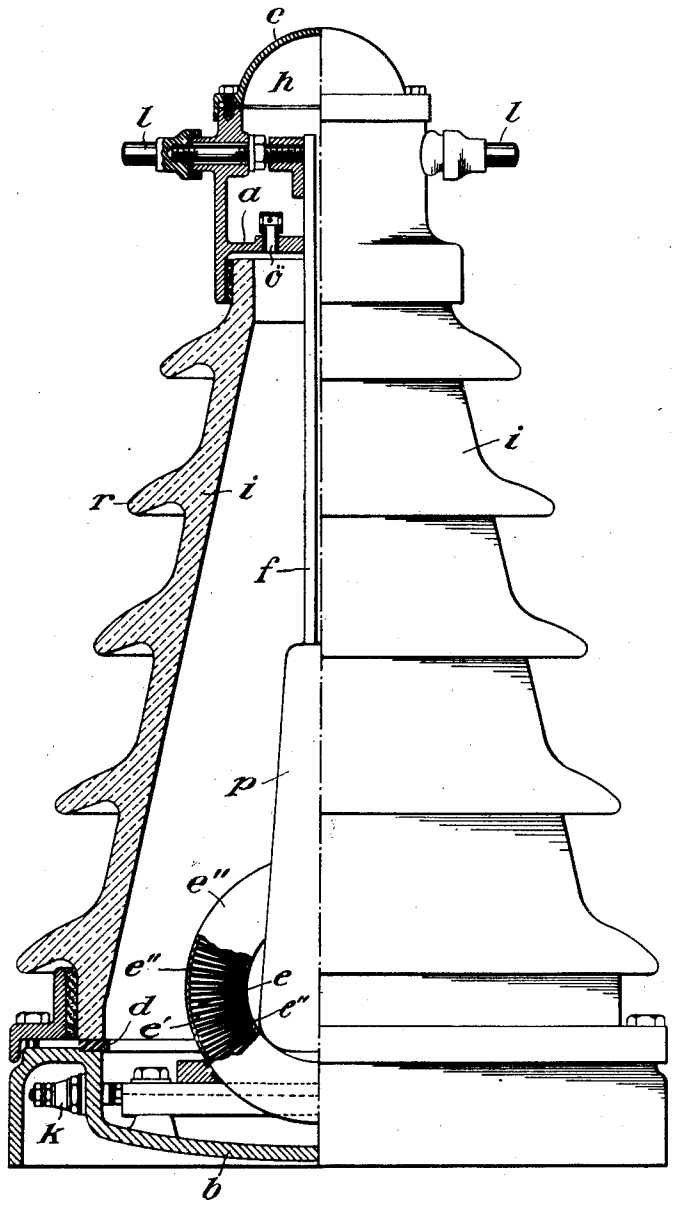

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UNITED STATES PATENT OFFICE

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HIGH-TENSION CURRENT TRANSFORMER

Application filed March 14, 1929, Serial No. 346,847, and in Germany March 14, 1928.

Our invention relates to improvements in high-tension current transformers.

Our improved high-tension current transformer is distinguished by very small dimensions in comparison with the service voltage and is not only inexpensive itself, but is, furthermore, so designed that the plant in which it is installed is also less costly.

Apart from the air-cooled transformers, the ordinary transformers consist in their external construction of an iron tank filled with a dielectric substance for the iron core and the windings and a bushing insulator dimensioned for the service voltage, which serves to introduce the high-tension primary leads into the grounded tank in a manner proof against flash-over and breakdown.

Extensive calculations and researches have shown that it is possible without increasing the dimensions of the insulator determined by the flash-over voltage in air, to accommodate in the insulator, the transformer proper which in customary constructions is usually contained in a special metal tank, so that the metal tank shrinks, so to say, into a simple base plate forming the bottom of the insulator. The height of the transformer is thus considerably reduced in comparison with the ordinary designs. Hollow base-supported or spreader insulators (also known as pedestal insulators) already existing in the high-tension distribution plant may also be used for housing the electrical parts of the transformers or a transformer according to our invention may be placed at a point at which otherwise a base-supported insulator would have to be provided.

It is furthermore possible to install a transformer subsequently and without any change in the direction of the line by simply replacing the existing spreader insulator with another insulator in the interior of which according to our invention a transformer is housed.

It is also possible to design a bushing insulator of the high-tension plant as a container for a transformer instead of a spreader insulator. Such an insulator then consists, as usual with very high voltages, of two sections joined by a narrow flange, the sections consisting of hollow supporting or spreader insulators.

In the drawing affixed hereto and forming part of our invention an embodiment of our invention is illustrated half in longitudinal section and half in elevation, a transformer for outdoor use being assumed.

The hollow base-supported or spreader insulator i rests with its lower edge upon a packing ring d on the metallic supporting base b. This insulator may be a standard article of the usual size and shape (circular cross section). Within this insulator is housed a current transformer of any usual or suitable construction, for instance with annular iron core supported on the metal base or bottom b and a ring-shaped primary winding p threaded through the core at right angles. The secondary or low-tension winding e' is directly wound upon the iron core e, and is preferably covered with a protective envelope e'' of solid insulating material, and terminates in terminals k, which are arranged in an annular depression or countersunk portion of the bottom b. The risk of a flash-over from the high-tension parts to the low-tension winding is thus avoided and a reliable protection obtained against rain. The primary p is also preferably covered with a protective envelope, made of solid material insulating against high tension; in the drawing, the primary proper does not really show, since the protective envelope encloses or covers the high-tension primary winding at all points thereof. The plane in which the high-tension winding is wound, extends in the direction of the longitudinal geometric axis of the insulator i, and the same remark will apply to the plane of the iron core e, both of said planes being axial

with reference to the insulator *i*, but perpendicular to each other. The height of the insulator *i* corresponds solely to the predetermined service voltage or operating voltage of the transformer, and the total or over-all height of the transformer, including its casing formed of the parts *c*, *a*, *i*, *b*, is substantially the same as that of a customary base-supported insulator dimensioned for the same operating voltage. The height of the bottom *b* is small relatively to that of the insulator *i*, being preferably less than one-fifth of the height of such insulator. The bottom *b* is set either on the ground or on an iron pole or mast, as is usual in apparatus of this character. The spreader insulator is filled with oil which enters through the opening *o* in the cover plate *a* provided in the head of the insulator into a special cavity *h* serving as oil expansion chamber and containing the terminals. In this chamber the level of the oil rises and falls as the temperature fluctuates, but in such a way that the opening *o* remains covered at all times. The high-tension conductors marked by the reference letter *l* traverse the cavity *h* without changing their direction. One of them is screwed into the dome-shaped cap *c* serving as protection against glow discharges and for closing the cavity in an oil-tight manner, the other traverses the cap and is insulated in it, but both are in the interior of the cap connected to the extended ends or brought-out longitudinal leads *f* of the high-tension winding.

The insulator is in the usual manner provided with ring-formed corrugations *r* to facilitate the running off of the rain.

When using two co-axially alined insulators joined by flanges at the lower ends and thus forming a bushing insulator, the bottom is omitted and only an outer annular member remains. The current transformer is then preferably arranged symmetrically in the interior of the combined insulators.

Various modifications and changes may be made without departing from the spirit and the scope of the invention, and we desire, therefore, that only such limitations shall be placed thereon as are imposed by the prior art.

We claim as our invention:

1. A high-tension current transformer, comprising in combination, a hollow spreader oil insulator, and iron core with primary and secondary winding immersed in the oil, a metal bottom fixed in an oil-tight manner at the foot of said insulator and adapted to support the iron core of said transformer, said metal bottom being countersunk along the edge to form an annular cavity serving for bringing out the low-tension terminals, the high-tension connecting leads of the primary winding traversing said insulator longitudinally and being brought out at the top.

2. A high-tension current transformer, comprising in combination, a hollow spreader oil insulator, an iron core with primary and secondary winding immersed in the oil, a metal bottom fixed in an oil-tight manner at the foot of said insulator and adapted to support the iron core of said transformer, said metal bottom being countersunk along the edge to form an annular cavity serving for bringing out the low-tension terminals, the high-tension connecting leads of the primary winding traversing said insulator longitudinally and being brought out at the top, and a glow discharge protecting cap located upon said insulator and enclosing the high-tension terminals and adapted to serve as oil expansion chamber.

3. The combination of a transformer comprising a high-tension primary, a core, and a low-tension secondary, with a casing enclosing said transformer and comprising an upper insulating member surrounding the high-tension primary, and a metallic base member having a countersunk portion in the bottom of its outer surface, said low-tension secondary having terminals arranged in such countersunk portion.

4. A high-tension current transformer comprising a casing which includes a supporting bottom and a spreader insulator carried by such bottom and made of a height corresponding solely to the predetermined operating voltage, an annular iron core within said casing, a low-tension winding on said core, and a high-tension winding extending through the iron core and through said low-tension winding, and located entirely within said insulator, the plane of said annular core, and the plane in which said high-tension winding is wound, both extending in the direction of the longitudinal axis of said insulator, and the ends of said high-tension winding leading to the outside at the top of said insulator.

5. A high-tension current transformer comprising a casing which includes a supporting bottom and a spreader insulator carried by such bottom and made of a height corresponding solely to the predetermined operating voltage, an annular iron core within said casing, a low-tension winding, a high-tension winding located entirely within said insulator, and an envelope enclosing the high-tension winding at all points thereof and made of solid material insulating against high tension, both ends of the high-tension winding leading to the outside at the top of said insulator, and both ends of the low-tension winding leading to the outside at the bottom of said insulator.

6. A high-tension current transformer comprising a hollow spreader insulator of a height corresponding solely to the predetermined operating voltage, a bottom closing the interior of the insulator at the lower end

thereof, the height of said bottom being small relatively to the height of said insulator, an iron core located within the space bounded by said insulator and said bottom, a low-tension winding and a high-tension winding, the ends of the latter winding leading to the outside at the top of said insulator, and an envelope enclosing the high-tension winding at all points thereof and made of solid material insulating against high tension.

In testimony whereof we affix our signatures.

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