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MEANS FOR CONVERTING ELECTRIC CURRENTS

Filed March 13, 1924

FIG. 1.

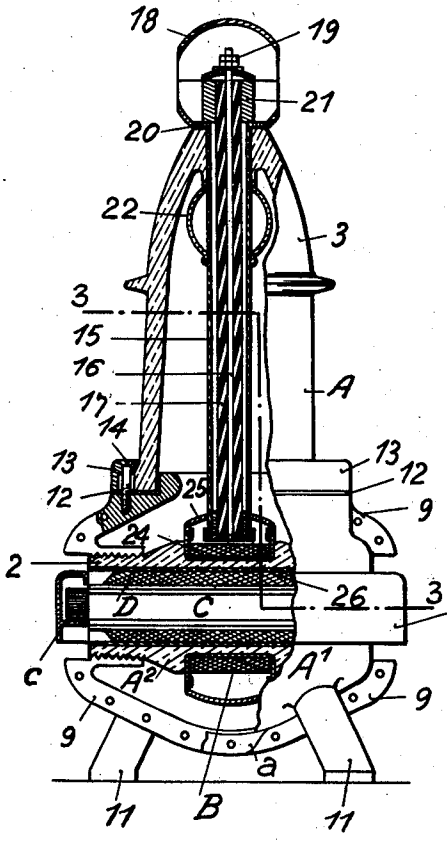
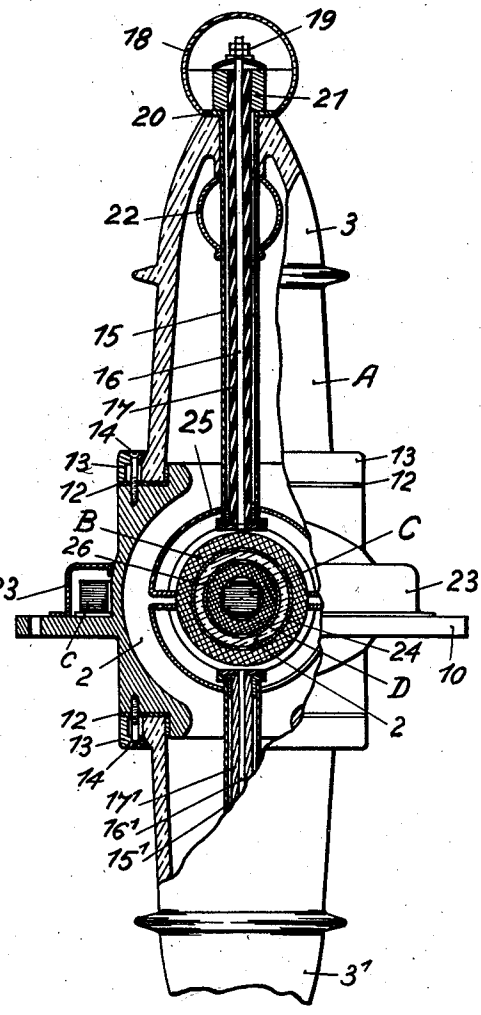


FIG. 2.



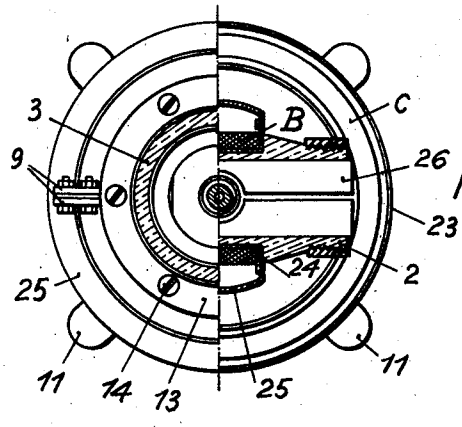


FIG. 3.

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UNITED STATES PATENT OFFICE.

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MEANS FOR CONVERTING ELECTRIC CURRENTS.

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My invention refers to devices for converting electric currents and more especially to a device operating in a manner similar to a transformer and designed mainly for very high voltages. The device according to the invention can be applied for instance for the purposes of measuring and testing high current plants. It has the outward appearance of the well known normal high current ducts and can be arranged in a similar manner, but serves at the same time for converting a primary current into a secondary current or for inductively connecting two circuits which are not conductively connected, thus simultaneously serving as a duct or leading-in and as a current converting means. It combines high efficiency when used for converting and similar purposes with great security against puncture and is distinguished from devices of this kind as heretofore constructed by its outer coil being more easily wound and by the comparative simplicity and low cost of manufacture of extensive and even very large size pieces of apparatus of the kind referred to.

The current converter according to the present invention substantially consists of a bulb-like bottle-shaped body made up, at least in its neck portion, of insulating material and the bulging portion of which is traversed by a passage or support of insulating material and upon the outer surface of which one of the coils and preferably the primary coil is wound, while the second coil, preferably the secondary one, together with its iron core is suitably mounted on the interior thereof.

In the drawings affixed to this specification and forming part thereof, a device embodying my invention is illustrated by way of example. In the drawings—

Fig. 1 is a longitudinal section with parts in elevation, the tubular passage being shown in axial section, while

Fig. 2 is a longitudinal section at right angles to the former, with parts in elevation, of a slightly modified form of construction, and

Fig. 3 is a plan view in section on the line 3, 3 of Fig. 1.

Referring to the drawings, the neck portion 3 of the body A is made of insulating material, the bulged or base portion 1 consisting of a metallic hollow body A^1, which has the support or tube 2 inserted therein as a separate body A^2 of insulating material. The tube 2 may be serrated or threaded at both ends and be engaged by semicylindrical sleeves formed in the two halves of the body A. This device is particularly adapted for use in the case of large-sized pieces of apparatus, inasmuch as it avoids all the difficulties arising in the manufacture of large bulb-shaped or sectional hollow bodies of porcelain or other insulating materials sufficiently resistant against puncture. But even in those cases where such difficulties do not arise this device offers economical and technical advantages which result from the higher mechanical strength and easier manipulation of the metallic portions, preferably made of cast iron in the establishing of the connections.

The hollow body A^2 forming the support or tubular passage 2 is made of insulating material sufficiently proof against puncture. In the case of smaller sizes, it may be manufactured of porcelain, or in other cases by being wound of hardened paper or by example of one of the modern kinds of insulating materials, it being possible to employ such materials even in the case of larger sizes without inconvenience in view of the simple, mainly tubular shape of the member. With its outer ends the body 2 is located in the bi-sectional bearings provided in the likewise bi-sectional metallic hollow body A^1, the two sections of which are separated by an insulating intermediate packing *a* and are tightly connected by the flanges 9, the bisectional construction of the bearing with a transversely extending joint and the bisectional construction of the hollow body A^1 being also instrumental in preventing metallic ring-short-circuiting action. By means of the flange 10 surrounding its bulged portion A^1 the converter according to Fig. 2 is mounted upon its support, while the device shown in Fig. 1 is intended to rest on feet 11. Upon the edge flange 12 of the body A^1 the insulating neck portion 3 is mounted and is fastened in a suitable manner, thus for instance by means of a ring 13 and screws 14, a suitable intermediate packing being inserted between the parts 3 and 12 as required by the presence of the oil filling.

In the modification represented in Fig. 2 an additional neck portion 3^1 extends downwardly from the bulb A^1.

Upon the body A^2 constituting the sup-

port 2 the coil B, preferably the primary coil, is wound. The neck portion 3 (Fig. 1) or, in the case of Fig. 2, the two neck portions 3, 3^1 are each traversed by a metal tube 15, 15^1, respectively, each of which tubes is in electric connection with one end of the outer coil B. In the form of construction shown in Fig. 1 the other end of the coil is connected to the bar-shaped conductor 16 which is mounted in the interior of the metal tube 15, and surrounded by an insulating tube 17. The conductor 16 terminates within the protecting globe 18 and is connected to the terminal 19. The disc or nut 20, which is screw-threadedly secured to the metal tube 15, serves as the second terminal in Fig. 1. Between the terminal 19 and the disc 20 a bridging resistance element 21 is inserted. This element is preferably made of a compound known as silit, said compound being made in the electric furnace from silica and carbon. The element 21 is connected in parallel to the primary coil 2 so that excess voltages are transferred to said element and puncture of the primary winding is prevented. In the interior of the neck portion 3 a distributing globe 22 is mounted upon the tube 15.

All these different parts are also employed in the modification according to Fig. 2, with the provision that they are used in duplicate. They are indicated at 15, 15^1; 16, 16^1; 17, 17^1 and so on. Two concentrically arranged conductors, such as 15 and 16, 15^1 are, however, only necessary in case that either the upwardly extending neck portion 3 or the downwardly extending neck portion 3^1, that is to say, one neck portion only is employed. In case, however, that, as before mentioned, one end of the windings of the coil B is upwardly conducted and the other end is extended downwards, only one conductor is required on each side, that is to say, either 15 or 16.

In the cavity of the body A^1 the inner coil D, preferably the secondary coil, is mounted. The core C with a ring *c* constitutes the outer iron closing means. The outer portions of the core are enclosed by the casing 23. In order to avoid injurious air space between the body A^2 and the coil B and, in order to provide, on the other hand, an electrostatic screening or protecting member for the coil, the metal armor 24 snugly follows the outline of the surface of the body A^2, and in combination with the casing 25 it constitutes a Faraday-screening cage.

In the interior of the support or duct A^2 any injurious air space intermediate the coil and the insulating body should likewise be avoided, or it should at least be rendered innocuous by suitable screening. As a means for obtaining such action, a metal lining 26 has been provided which is inserted in the body A^2 and snugly fits the inner surface thereof. The lining 26 is, of course, provided with a longitudinal slot, and, on the other hand, the cage 24, 25 should not be made to constitute a metallically closed annular body. Both screening jackets should be connected to each one terminal of their corresponding coils, or they may be inserted in the coil windings. The lining 26 may also be electrically connected to the core C or it may be otherwise earthed. Instead of using the lining 26, the air space between the coil D and the body A^2 may be avoided by tight insertion of the coil, or the space may be packed with some solid material or some other fusible and solidifiable di-electric substance may be poured into it.

The cavity of the entire body may and should preferably be filled with oil or with some other liquid or solidifying or gaseous insulating material.

My invention is obviously not restricted to the modifications and forms of constructions herein shown and described, but it is capable of various other modifications and forms of embodiments, and it is susceptible of various changes and modifications in the relative arrangement of parts and connections to correspond to existing conditions of use, but without deviating from the spirit of my invention.

I claim:—

1. A device of the kind described, comprising an insulating hollow body, an enlarged metallic bi-sectional portion on said body, an insulating substantially tubular support traversing said metal portion, one of a pair of induction coils on the outside of said support, a complemental coil of said pair in the interior of said support and electric connections with said coils at the inside and outside of said body.

2. A device of the kind described, comprising an insulating hollow body, an enlarged metallic bi-sectional portion on said body, an insulating substantially tubular support traversing said metal portion, one of a pair of induction coils on the outside of said support, a complemental coil of said pair in the interior of said support, electric connections with said coils at the inside and outside of said body, an electrostatic slotted metal screen mounted on said support and electrically connected to the induction coils and conducting means inside and outside of said body and respectively electrically connected to one of said coils.

3. A device of the kind described, comprising an insulating hollow body, an enlarged metallic bi-sectional portion on said body, an insulating substantially tubular support traversing said metal portion, one of a pair of induction coils on the outside of said support, a complemental coil of said pair in the interior of said support, electric connections with said coils at the inside and

outside of said body, an electrostatic slotted metal screen mounted on said support and electrically connected to the induction coils, a metallic lining screen within said support electrically connected to the outer screen and conducting means inside and outside of said body and respectively electrically connected to one of said coils.

4. A device of the kind described, comprising an insulating hollow body, an enlarged metallic bi-sectional portion on said body, an insulating substantially tubular support traversing said metal portion, one of a pair of induction coils on the outside of said support, a complemental coil of said pair in the interior of said support, electric connections with said coils at the inside and outside of said body and screening means for said coils.

5. A device of the kind described, comprising an insulating hollow body, an enlarged metallic, bi-sectional portion on said body, an insulating substantially tubular support traversing said metal portion, one of a pair of induction coils on the outside of said support, a complemental coil of said pair in the interior of said support, electric connections with said coils at the inside and outside of said body and insulating and screening means operatively related to said support.

6. A device of the kind described, comprising an insulating hollow body, an enlarged metallic bi-sectional portion on said body, an insulating substantially tubular support traversing said metal portion, one of a pair of induction coils on the outside of said support, a complemental coil of said pair in the interior of said support, electric connections with said coils at the inside and outside of said body and a solidifiable dielectric intermediate said interior coil and said support.

In testimony whereof I affix my signature.

FRANZ JOSEF FISCHER.