No. 835,023. PATENTED NOV. 6, 1906.

H. HEINICKE.

TRANSFORMER.

APPLICATION FILED JAN. 17, 1905.

Fig.1

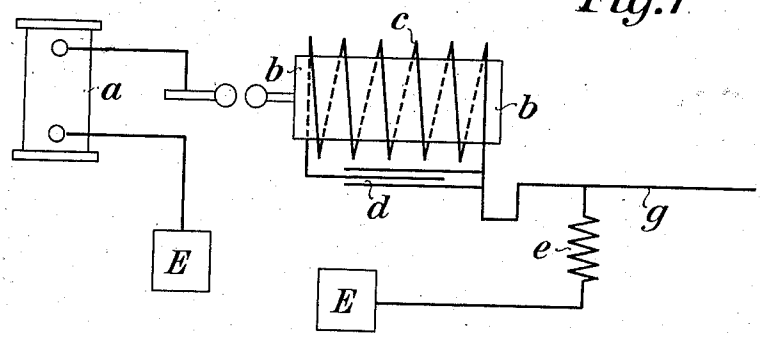


Fig.2.

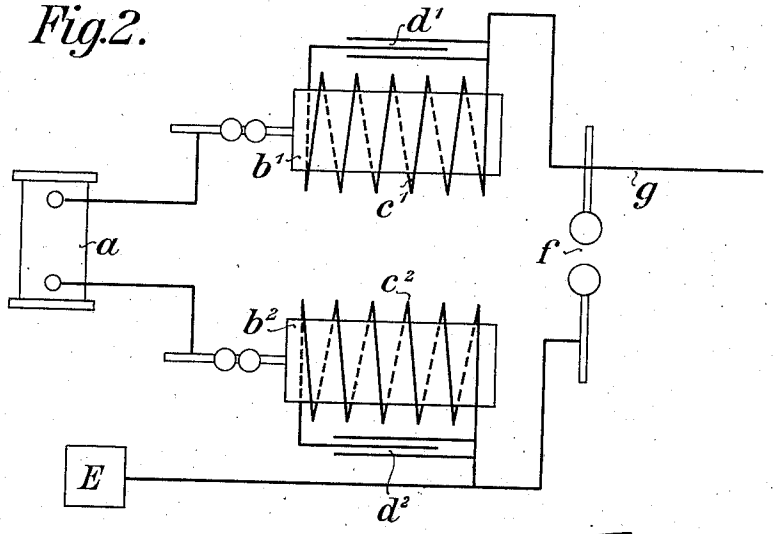
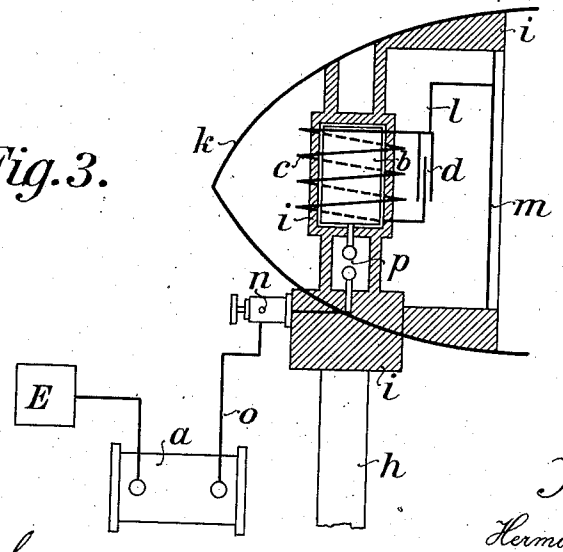


Fig.3.



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TRANSFORMER.

No. 835,023. Specification of Letters Patent. Patented Nov. 6, 1906.

Application filed January 17, 1905. Serial No. 241,441.

To all whom it may concern:

Be it known that I, HERMANN HEINICKE, a subject of the German Emperor, residing at Steglitz, near Berlin, in the Kingdom of Prussia, Germany, have invented certain new and useful Improvements in Transformers, of which the following is a specification.

The subject of my invention is a transformer for high-tension electric currents for producing electric waves especially suited for wireless telegraphy, but also applicable for therapeutic and other purposes.

The new transformer consists, essentially, of a well-insulated metallic core, which may be either solid or hollow, and of a coil of wire wound round the said core and having its extremities connected to the layers of a condenser.

To employ the transformer, the electric waves produced by any suitable source of high-tension electric currents, such as an induction-coil or an influence-machine, are allowed to pass to the metallic core with or without a charging spark-gap, while the one end of the coil surrounding the core—that is to say, one layer of the condenser—is connected with devices such as are used as electrodes in wireless telegraphy or for therapeutic or other purposes.

That it is a fact that induction-currents are actually produced in the coil can be very readily proved by detaching the ends of the coil from the condenser and approaching them toward each other to a certain extent. Sparks will now be observed to pass between the two ends of the coil and pronounced physiological effects experienced. Thus in the transformer capacity induction and self-induction are combined, and the coil wound on the core stands in close relation to the properties of the electric waves which the core produces.

In the application of the transformer to wireless telegraphy experiments show that as compared with the well-known systems of Marconi and Braun extremely pure waves are produced at the antenna and great economy of energy effected.

In order that the most favorable conditions may be attained for various distances—that is to say, in order that the length of the waves may be varied—the metallic core is arranged to slide in axial direction on the core.

In the accompanying drawings my invention is illustrated in its application as transformer for wireless telegraphy.

Figure 1 is a diagram showing the apparatus constructed with only one metallic core. Fig. 2 is a like view of an apparatus having two cores. Fig. 3 is a vertical sectional view illustrating the employment of the apparatus in conjunction with a parabolic reflector or casing.

Referring more particularly to Fig. 1, the transformer consists of the insulated metallic cylinder *b* and coil *c*, connected directly with the condenser *d*. The transformer is connected (a charging spark-gap being left between the two) with one pole of the secondary circuit of an induction-coil *a*, which is shown without battery, the other pole of which is grounded. To the one end of the coil *c*—that is to say, to one of the layers of the condenser *d*—is connected a resistance—for instance, a second coil *e*, one extremity of which is connected with the antenna *g*, while the other extremity is grounded or connected with an extensive metallic surface, constituting a so-called "electrical counterweight." Instead of the coil *e* another resistance—for instance, a sparking distance—may be employed, in which case the gap between the transformer and the induction-coil may be dispensed with.

In Fig. 2 two transformers of the kind described are shown. Each pole of the secondary circuit of the induction-coil *a* is connected with an insulated metallic cylinder b' b^2, respectively, while between the one end of the coil c' and the one end of the coil c^2—that is to say, between one layer of the condenser d' and one layer of the condenser d^2—a resistance—for instance, a sparking distance *f*—is provided. At this gap one pole is connected with an antenna *g* and the other pole with the earth-plate E. Instead of the spark-gap *f* another resistance—for instance, a coil—may be employed, in which event it proves advantageous to provide a charging spark-gap between one of the two transformers and the induction-coil.

The above-described transformer can also be employed for directed telegraphy without wires by fixing it at a suitable height above the ground and connecting it with a source of electricity in the manner set forth. The radiation of the electric waves is effected by a wire structure of any suitable nature, such

as a network, a brush, a coil, or the like. The transformer and the wire structure which radiates the waves may with advantage be inclosed in a metallic parabolic hollow casing or reflector, which may be constructed of wire-netting or perforated sheet metal.

Fig. 3 illustrates such an arrangement. *h* is a column supporting an insulating structure *i*, in one portion of which the metallic cylinder *b* is located within the casing *k*. The wire coil *c* is wound round the insulating-chamber containing the core or cylinder *b*, and its ends are connected with the two layers of the condenser *d*. The one layer of the latter is connected with the wire radiating structure *m* by a wire *l*. From the terminal screw *n* at the head of the column *h* a wire *o* leads to the induction-coil *a*, so that the waves excited by the latter pass across the charging spark-gap *p* below the cylinder *b* and agitate the vibratory system contained within the casing *k*, thus causing it to vibrate likewise.

In employing the transformer in electro-therapeutics an electrode with flexible cord would be attached to the one end of the coil. For such purposes the arrangement shown in Fig. 2 may be advantageously used, there being then two electrodes at disposal.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. A transformer for high-tension electric currents for the production of electric waves for wireless telegraphy, therapeutic and other purposes comprising an insulated metallic core, a coil wound round the latter, a source of electricity in connection with the core, and a condenser connected directly with the ends of the coil, substantially as described.

2. A transformer for high-tension electric currents for the production of electric waves for wireless telegraphy, therapeutic and other purposes comprising an insulated metallic core, a coil wound round the latter and sliding thereon in axial direction, a source of electricity in connection with the core, and a condenser connected directly with the ends of the coil, substantially as described.

3. A transformer for high-tension electric currents for the production of electric waves for wireless telegraphy, therapeutic and other purposes comprising two insulated metallic cores, a coil wound round each of the latter, a source of electricity having each pole connected with one of the cores, and condensers connected directly with the ends of each of the coils, substantially as described.

4. A transformer for high-tension electric currents for the production of electric waves for wireless telegraphy comprising an insulated metallic core, a coil wound round the latter, an antenna connected with the one end of the coil, a source of electricity in connection with the core, and a condenser connected directly with the ends of the coil, substantially as described.

5. A transformer for high-tension electric currents for the production of electric waves for wireless telegraphy comprising two insulated metallic cores, a coil wound round each of the latter, an antenna connected with the one end of each coil, a source of electricity having each pole connected with one of the cores, and condensers connected directly with the ends of each of the coils, substantially as described.

6. A transformer for high-tension electric currents for the production of electric waves for wireless telegraphy comprising two insulated metallic cores, a coil wound round each of the latter, a grounded resistance running from the one end of each coil, an antenna connected with the said resistance, a source of electricity having each pole connected with one of the cores, and condensers connected directly with the ends of each of the coils, substantially as described.

7. A transformer for high-tension electric currents for the production of electric waves for wireless telegraphy comprising two insulated metallic cores, a coil wound round each of the latter, an earth connection, in which a spark-gap is interposed between the two coils, running from the one end of each coil, an antenna connected with the said earth connection on the opposite side of the gap to that on which the earth contact is located, a source of electricity having each pole connected with one of the cores, and condensers connected directly with the ends of each of the coils, substantially as described.

In testimony whereof I have hereunto signed my name in the presence of two subscribing witnesses.

HERMANN HEINICKE.

Witnesses:
HENRY HASPER,
WOLDEMAR HAUPT.