Feb. 18, 1936. J. BETHENOD ET AL 2,030,957

ELECTROMAGNETIC APPARATUS

Filed Dec. 29, 1933

Fig. 1

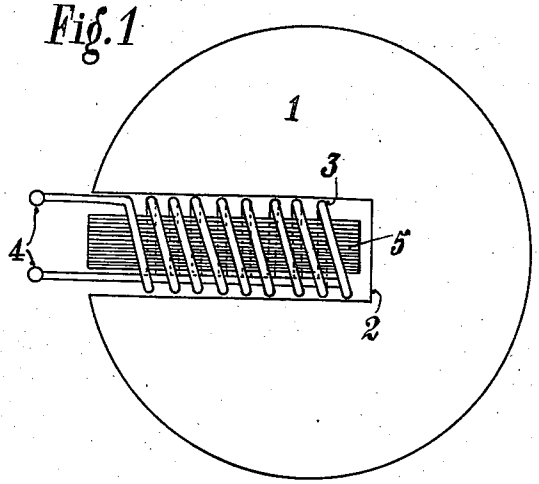
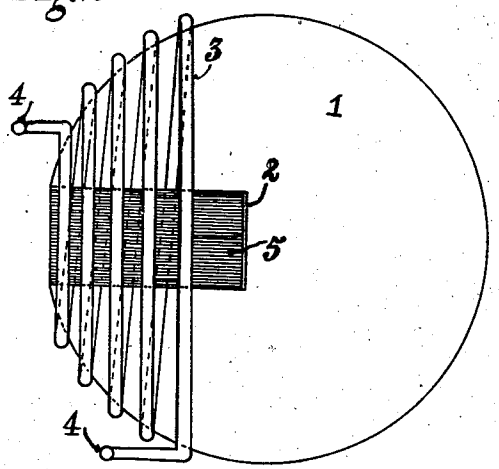


Fig. 2



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ELECTROMAGNETIC APPARATUS

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Application December 29, 1933, Serial No. 704,558
In Germany January 9, 1933

10 Claims. (Cl. 176—122)

The capital importance of a considerable current density for the production of ultra-violet and luminous radiations of adjustable composition has already been pointed out in the prior U. S. A. patent application No. 618,402, filed June 20, 1932. When rare gases, such as krypton and xenon, are acted upon by electro-magnetic induction, this considerable density is obviously an increasing function of the rate of variation of the magnetic field in each point of the envelope. According to the present invention, the necessary rate for variation may be attained with currents of a frequency not exceeding that which may be produced industrially by an alternator, say about 30,000 cycles per second, provided that conditions are so arranged to obtain a magnetic field of sufficient amplitude.

At any rate, the invention will be well understood with the aid of the accompanying drawing, wherein

Figures 1 and 2 are diagrammatic views showing arrangements of the type under consideration.

In Figure 1, the spherical vessel 1 is shown provided with a cylindrical casing 2 which penetrates into the interior and forms a gas-tight housing for a coil 3, the terminals 4 of which are connected to a source of high-frequency current, such as an alternator, a triode generator or the like. Experiment shows that the desired effect is thus obtained under excellent conditions. According to one of the features of the invention, these conditions are still further improved by disposing within the coil 3, a core 5 of magnetic substance, formed for example of strips of thin sheet iron (placed radially) or by wires of very small diameter, with a view to reducing, in known manner, the eddy current losses. From this point of view, it is of advantage to make the said magnetic core of metal in the state of powder, the grains of which are agglomerated by a suitable insulating substance. Experiment shows that it is thus possible to attain, even at frequencies of the order of those employed in radiotelegraphy, an apparent permeability of at least 7 to 8 (the permeability of air being taken as unity), the losses remaining well within the acceptable limits.

In Figure 2, the inductance coil 3 is wound outside the vessel 1, and this method may afford certain constructional advantages. Even with this arrangement, the adjunction of a ferro-magnetic core 5, preferably of iron in powder form, is generally of considerable importance, as found experimentally. Of course, it is necessary to fix the length and diameter according to each application.

The curve of the magnetizing current as a function of the time may depart, if desired, from the sinusoidal shape and in particular may assume a pointed shape, due to the presence of harmonics of an amplitude which, if necessary, is increased artificially by any known means (magnetic saturation, or the like).

Having now particularly described and ascertained the nature of the said invention and in what manner it is to be performed, we declare that what we claim is:

1. A process for the production of ultra-violet and luminous radiations of adjustable composition, comprising inductively exciting a gaseous atmosphere containing at least one rare gas by exciting an inductive winding with high frequency current, and increasing the current density in said atmosphere to a value sufficiently high to produce spark spectra by positioning a magnetic core in said winding and in said atmosphere.

2. An apparatus for producing ultra-violet and luminous radiations of adjustable composition by electromagnetically exciting a gaseous atmosphere containing at least one rare gas, comprising an envelope containing the gaseous atmosphere, a cylindrical casing penetrating into the interior of the envelope, the inner end of said casing being closed to prevent communication between said envelope and casing, a magnetic core positioned in said casing, and a high frequency excited coil positioned in said casing and surrounding said core for setting up a magnetic field to induce current into said gaseous atmosphere.

3. An apparatus for producing ultra-violet and luminous radiations of adjustable composition by electromagnetically exciting a gaseous atmosphere containing at least one rare gas, comprising an envelope containing the gaseous atmosphere, a cylindrical casing penetrating into the interior of the envelope, the inner end of said casing being closed to prevent communication between said envelope and casing, a magnetic core positioned in said casing, and a high frequency excited coil positioned exteriorly of said casing and surrounding said core and envelope for setting up a magnetic field to induce current into said gaseous atmosphere.

4. An apparatus as set forth in claim 2, in which the core is formed of strips of thin iron radially arranged.

5. An apparatus as set forth in claim 3, in

which the core is formed of strips of thin iron radially arranged.

6. An apparatus as set forth claim 2, in which the core is formed of wires of very small diameter.

7. An apparatus as set forth in claim 3, in which the core is formed of wires of very small diameter.

8. An apparatus as set forth in claim 2, in which the core is formed of magnetic substances in the form of powder, the grains of which are agglomerated by means of an insulating substance.

9. An apparatus as set forth in claim 3, in which the core is formed of magnetic substances in the form of powder, the grains of which are agglomerated by means of an insulating substance.

10. An apparatus for producing ultra-violet and luminous radiations of adjustable composition by electromagnetically exciting a gaseous atmosphere containing at least one rare gas, comprising an envelope containing the gaseous atmosphere, a high frequency exciting winding for inductively exciting the gas in said envelope, and a magnetic core surrounded by said winding and the gaseous atmosphere for increasing the current density in the gaseous atmosphere to a value required for the production of spark spectra.

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