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THERMIONIC EMITTING DEVICE

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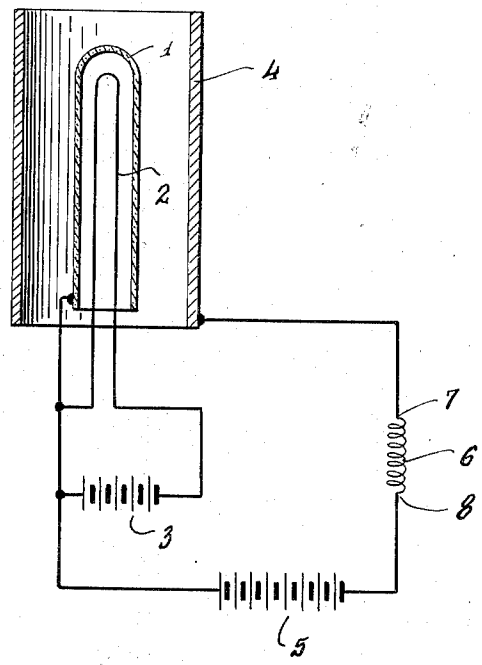

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THERMIONIC EMITTING DEVICE

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It is known that when certain metallic bodies, metal salts or metal oxides are highly heated, they emit positive ions or electrons; the ionic currents thus obtained could be put to numerous uses if their intensities were sufficient and if they remained constant during a certain interval of time. This has not been the case up to the present, since when a metallic wire, such as a platinum wire, is heated in vacuum or in a gas, it emits positive ions the intensity of which at first increases very rapidly, to diminish thereafter with an equal rapidity and finally remain, after a relatively very short time interval, at a very low value.

Now, it has been found, according to the present invention, that it is possible to obtain a source of ionic current of great intensity, for example of the order of one milliampere, under a tension of 200 to 300 volts, and of good constancy, by heating a metal, a metal salt or a metal oxide, the said metal, metal salt or metal oxide being used in a state conferring thereto very large contact surfaces, for example in a state of a precipitate, and in a gas at relatively high pressure, in ambient air, for example.

It has been observed that, due to the gas or air current which surrounds this heated metal, salt or oxide, and which constantly impinges on the said metal, metal salt or oxide, a kind of a regeneration of the emissive power of the said metal, metal salt or oxide is produced. Moreover, the emission of ions being a function of the surface of the heated body, said emission is very substantially increased by the state of very fine division under which it is used and which confers to it a very large surface. Finally, this state also facilitates to a large extent the regeneration of the emissive power of the metal, metal salt or oxide by the air current. As a result of the above combination, a much more intense ionic current is produced than with the emitting devices previously known and, above all, its maintenance, with a good constancy, at a value enabling it to be put to numerous uses is ensured.

According to another feature of the invention, as thermionic source, use is made of a precipitate of platinum or of another metal absorbing gases, air for example, whereby the regenerating effect due to the gas or air current is substantially increased.

Another feature of the invention consists in making use, as first electrode, the positive ion emitting device, in providing a second electrode which attracts the ions and in disposing on the

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first electrode a metallic product which is driven off on to the second electrode and thus compensates for the deposit of impurities on the latter, which deposit hinders the discharge of ions on the said second electrode and therefore decreases the intensity of the current of ions; thus, for example, an iridium deposit on the first electrode gives very good results.

In the diagram, a first ion-emitting electrode 1 is heated by means of a filament 2 through which an electric current flows that is generated by the source 3; a second electrode 4 surrounds the first said electrode 1; an electric circuit is closed from the electric source 5 through the inductance 6 by the said second electrode 4; the ions are collected at the terminals 7 and 8 of the inductance 6.

According to an embodiment of the invention, given by way of example, solely in an indicative and in no wise restrictive manner, as thermionic emitting device, use is made of a quartz tube covered with a metallic paste and heated inside by a metallic filament through which flows an electric current, for example a rhodiated platinum filament mounted on a quartz rod.

The quartz tube serving as a support for the metal which is to emit the ionic currents can, for example, have a length of 5 centimeters and a diameter of 2 millimeters. It is covered with a precipitate of platinum and iridium to which is added aluminum phosphate; after strong calcination, this layer firmly combines with the quartz. The whole is then covered with a very thin layer of pure iridium. The second electrode is constituted by a metal tube adapted to resist oxidation under the conditions of use; for instance, use may be made of a tube plated with gold.

A difference of potential is produced between the thermionic emitting device and the second electrode. The positive ions emitted by the thermionic emitting device proceeds toward the second electrode. This emission may be enhanced, if necessary, by a grid similar to the screening grid of wireless lamps, and placed between the emitting device and the second electrode and to which an intermediary potential is applied.

It is to be understood that the invention is in no wise limited to this particular form of embodiment given solely in an indicative but not in a restrictive manner and that numerous modifications can be made without thereby departing from the ambit of the present invention

which covers, moreover, all possible uses of such emitting device.

What I claim as my invention and desire to secure by Letters Patent is:

1. A thermionic positive ion emitting device comprising a pair of electrodes located in a gaseous atmosphere having an order of pressure of from 1 millimeter mercury to atmospheric, one said electrode including a finely divided metallic substance capable of large positive ion emission, and means to heat said substance, said device being capable of generating a stable ionic current the intensity of which is of the order of a milliampere where the effective area of the positive ion emitting electrode is of the order of 300 to 400 square millimeters and under the application of an inter-electrode potential of the order of 200 to 300 volts.

2. A thermionic positive ion emitting device comprising a pair of electrodes located in air at a pressure of from one millimeter mercury to atmospheric, one said electrode including a finely divided metallic substance capable of large positive ion emission, and means to heat said substance, said device being capable of generating a stable ionic current the intensity of which is of the order of a milliampere when the effective area of the positive ion emitting electrode is of the order of 300 to 400 square millimeters and under the application of an inter-electrode potential of the order of 200 to 300 volts.

3. A thermionic positive ion emitting device comprising a pair of electrodes located in air at substantially atmospheric pressure, one said electrode including a finely divided metallic substance capable of large positive ion emission, and means to heat said substance, said device being capable of generating a stable ionic current the intensity of which is of the order of a milliampere when the effective area of the positive ion emitting electrode is of the order of 300 to 400 square millimeters and under the application of an inter-electrode potential of the order of 200 to 300 volts.

4. A thermionic positive ion emitting device comprising a pair of electrodes located in a gaseous atmosphere having an order of pressure of from one millimeter mercury to atmospheric, one said electrode having an effective area of the order of 300 to 400 millimeters and including a finely divided metallic substance capable of large positive ion emission, and means to heat said substance, said device being capable of generating a stable ionic current the intensity of which is of the order of a milliampere under the application of an inter-electrode potential of the order of 200 to 300 volts.

5. A thermionic positive ion emitting device comprising a pair of electrodes located in a gaseous atmosphere having an order of pressure of from one millimeter mercury to atmospheric, one said electrode including a quartz tube, and means for heating said tube comprising a metallic filament therein, said tube being coated with a platinum precipitate and an iridium precipitate.

6. A thermionic positive ion emitting device comprising a pair of electrodes located in a gaseous atmosphere having an order of pressure of from one millimeter mercury to atmospheric, one said electrode including a quartz tube, and means for heating said tube comprising a metallic filament therein, said tube being coated with a platinium and an aluminium phosphate precipitate.

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