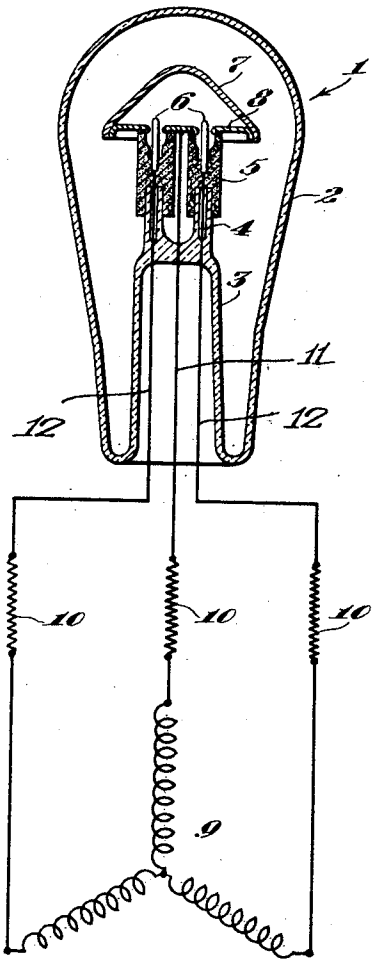
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EVACUATION SYSTEM

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Inventor
Percy L. Spencer
by [illegible]
Atty.

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PERCY L. SPENCER, OF MEDFORD, MASSACHUSETTS, ASSIGNOR TO RAYTHEON INC., OF CAMBRIDGE, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS

EVACUATION SYSTEM

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The invention relates broadly to the manufacture of space current devices and in particular to an improved method of treating the electrodes.

Heretofore, it has been customary during the evacuation process to heat the electrodes in order to remove gases occluded in the metal either by passing a bombarding discharge between them or inducing a current in one or more of the metallic bodies by an externally located coil. For electrical bombardment, there has been employed direct current of polarity such as to impel the discharge toward the electrode of considerable metal content, usually the positive member. While the anode treatment by direct current is satisfactory in case the cooperating electrode holds little or no gas in occlusion, e. g. a filamentary cathode, and for that reason requiring no preliminary heating, it fails to offer a double way bombardment in the event the cathode constitutes a nonthermionic member or has large mass. Moreover, in apparatus involving two or more cathodes or anodes, prior art offers no automatic shift of bombarding discharge between the various combinations of electrodes with the result that the elements are subjected to heat treatments of different degrees.

An object of my invention is to provide a simple, inexpensive and effective method of heat treating electrodes and, in general, to improve the manufacture and operation of gaseous conduction apparatus.

In the drawing which illustrates a preferred embodiment, numeral 1 designates the device undergoing the process of manufacture. This device may comprise any form of space current apparatus; for convenience, I show a rectifier of the Raytheon type BH so-called such as described and claimed in the applications of Smith, Serial No. 526,095 and Jenks, Serial No. 752,867 and Bush, Serial No. 22,988. While a specific type of rectifier is described hereinafter, it is to be understood that my invention is not limited thereto but applies broadly to all electric discharge devices that employ a plurality of electrodes containing gaseous impurities. The illustrated rectifier comprises an envelope 2 terminating in reentrant stem 3 from which two glass tubular members 4 project. Fitting over the projections, there are insulating thimbles 5 of lava or the like having a relatively fine bore through which the anodes 6—6 of refractory metal extend. About the latter, a hollow cathode 7 of refractory metal is mounted, said cathode having a hemispherical, conical or other shape, and closed along the horizontal plane by cover 8, preferably of the same metal as the cathode.

As explained in the applications supra, a device such as described offers less impedance for current passing from the anode to the cathode than vice versa and is adapted for rectifying alternating current of relatively low voltage, e. g. below 200 volts. During the evacuation process, I propose to heat each of the electrodes and accordingly provide a polyphase source of current 9 of relatively high potential, e. g. 550 volts, connections being had with the electrodes through current limiting resistors 10 and wires 11, 12. It will be evident that the current source produces an electrical discharge between each pair of electrodes in succession, the electron or ion bombardment being sufficient to raise the temperature of the metallic bodies to a point where the occluded gases escape and pass off to the evacuating pump.

Experience has shown that when using polyphase current for this purpose, a discharge is maintained between electrodes even at a low pressure of residual gas within the tube, and moreover, the variable character of the current precludes the discharge from staying at any particular spot on the electrodes. If desired, a small amount of hydrogen, e. g. 4 m. m. or less may be admitted to permit the discharge to start, although ordinarily this is not necessary. The period of each discharge is automatically regulated by the current supply, according uniformity of treatment to each electrode and also to the device as a whole. The heat treatment and the evacuation of occluded gases having been completed, a hydrogen wash may be employed while on the

pump and finally, inert gas, e. g. helium or the like, admitted to the envelope which is sealed off in the usual manner. In this way the entire gas of occlusion and impurities are effectively removed, a device being produced which offers increased efficiency and decided improvement in operation.

I claim:

1. In the manufacture of a gas discharge device of the type comprising an evacuated envelope enclosing a large-area cathode and a plurality of small-area anodes, and an atmosphere of an inert gas, the method of depriving said electrodes of occluded gases which comprises connecting said cathode and said anodes to the individual phases of a polyphase alternating current source and maintaining a polyphase space current discharge between said electrodes while simultaneously evacuating said envelope.

2. In the manufacture of a gas discharge device of the type comprising a cathode having an extended discharge surface and a plurality of anodes, each of said anodes having a small discharge surface, said anodes and cathode being presented to a common discharge space, and an atmosphere of an inert gas in said discharge space, the method of depriving said electrodes of occluded gases which comprises connecting said cathode and said anodes to the individual phases of a polyphase alternating current source, and maintaining a polyphase space current discharge in said discharge space between said electrodes while simultaneously evacuating said envelope.

In testimony whereof, I have signed my name to this specification this 13th day of March, 1928.

PERCY L. SPENCER.