

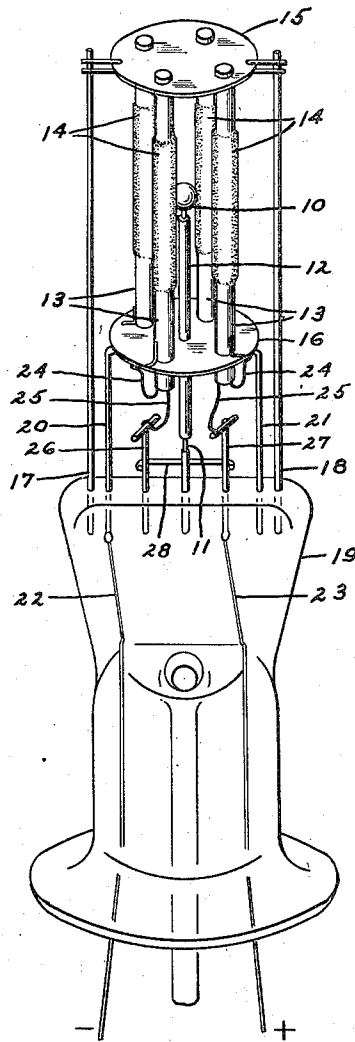
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E. FRIEDERICH

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ELECTRIC LAMP

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INVENTOR
ERNST FRIEDERICH
BY *Harry E. Dunham*
HIS ATTORNEY

UNITED STATES PATENT OFFICE

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ELECTRIC LAMP

Ernst Friederich, Berlin-Charlottenburg, Germany, assignor to General Electric Company, a corporation of New York

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5 Claims. (Cl. 176—123)

My invention relates to electric lamps and more particularly to the type of lamp disclosed in my pending U. S. application Serial No. 660,701, filed March 14, 1933, Pat. No. 1,998,959, in which light is produced by a bombardment of electrons on an incandescible anode.

I have found that in the type of lamp referred to above it is particularly advantageous in many cases to use, instead of a single indirectly heated cathode, a plurality of such cathodes for heating the anode which serves as the light source. In this way a better distribution of the electric load is obtained. The electron current which flows to the anode and therefore the heating of the anode, are intensified without increasing the cathode load. A particular advantage of employing a plurality of cathodes lies in the fact that it is possible to dispose the said cathodes around the anode which is thereby heated very uniformly on all sides by the electron bombardment from said cathodes. It is thus possible to use a solid body for the cathode instead of a filamentary structure. The crystallization effects of a filament are thus avoided and vaporization is very slight. It is also possible to use for the anode materials which have a high melting point and are difficult to work into a wire and which for that reason have not been employed in the incandescent lamp industry. Such materials comprise particularly the carbides such as tantalum carbide, niobium carbide, zirconium and hafnium carbide. Carbon may also be employed for the anode. The anode may consist of a block or ball and thereby provide a small source of light of high intensity for projection purposes.

Further features and advantages of my invention will appear from the following detailed description of species thereof.

The drawing is a perspective view of the internal elements of a lamp comprising my invention, the usual bulb being omitted.

Referring to the drawing, an anode 10 consisting of a spherical block of, for example, 3 mm. diameter, is mounted on a center support wire 11 which is enclosed in an insulating tube 12. The anode 10 is surrounded by four cathodes 13 which are connected in parallel and heated indirectly. The said cathodes 13 are of the known type comprising an insulating tube heated by an embedded heater (not shown) and a metallic coating on the insulating tube having a coating 14 of an electron emitting material. The cathodes are held in place by a pair of discs 15, 16. The upper disc 15 which consists of insulating material such as mica is mounted on support wires 17, 18 the

lower ends of which are embedded in the stem press 19. The lower disc 16, which consists of metal, is mounted on support wires 20, 21 and is electrically connected to the metal layers of cathodes 13.

Portions of leading-in wires 22, 23 are sealed in the stem press 19. The leading-in wire 22 which is connected to the support wire 20, is connected to the negative side of the source of electrical energy. The disc 16 and cathodes 13 are thereby charged negatively. Four wires 24 (only the front two being shown) lead from the disc 16 to the enclosed heaters (not shown) of the cathodes. The positive ends 25 of the cathode heaters are connected to wires 26, 27 the ends of which are embedded in the stem press 19. The wires 26, 27 are electrically connected to the anode support 11 by a cross wire 28 and the wire 27 is connected to the positive leading-in wire 23.

In order to avoid the formation of a black deposit on the walls of the bulb at the high anode temperature, materials such as cryolite, sodium chloride and calcium fluoride may be used as is well known in the incandescent lamp art. One or more grids may be provided between the cathodes and anode to limit the space charge. If the anode is suspended it may under certain circumstances be heated up to its melting point in which case it must be steadily advanced similar to arc lamps.

The lamps can be operated on all suitable voltages. If alternating current is used, the cathodes that are connected to different phases must be shielded from each other, for example, by mica discs.

What I claim as new and desire to secure by Letters Patent in the United States is:

1. An electric lamp comprising a plurality of electron sources consisting of indirectly heated cathodes and an incandescible anode which is heated to incandescence by electron bombardment from said cathodes, said cathodes being disposed around said anode.

2. An electric lamp comprising a plurality of electron sources consisting of indirectly heated cathodes and an incandescible anode consisting of a solid body of refractory material which is heated to incandescence by electron bombardment from said cathodes, said cathodes being disposed around said anode.

3. An electric lamp comprising a plurality of electron sources consisting of indirectly heated cathodes and an incandescible anode consisting of a solid body of refractory metallic carbide

which is heated to incandescence by electron bombardment from said cathodes, said cathodes being disposed around said anode.

4. An electric lamp comprising at least three
5 electron sources consisting of indirectly heated cathodes and an incandescible anode which is heated to incandescence by electron bombardment from said cathodes, said cathodes being symmetrically disposed around said anode.

10 5. An electric lamp comprising a plurality of substantially symmetrically disposed cathodes each comprising a heater surrounded by a metal

tube having a layer of electron emissive material thereon, an incandescible anode which is heated to incandescence by electron bombardment from said cathodes, said anode being disposed substantially at the center of said cathodes, a
5 lead, means electrically connecting one end of each of said cathode heaters and said anode with said lead, a second lead, and means electrically connecting the opposite ends of each of said heaters and said surrounding metal tubes
10 with said second lead.

ERNST FRIEDERICH.