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INCANDESCENT CATHODE

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Fig. 1

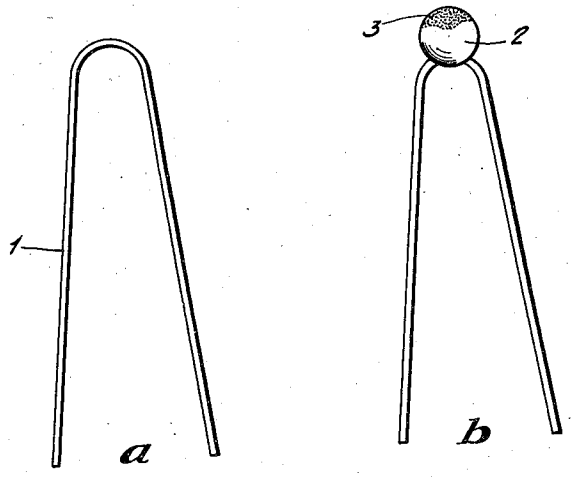
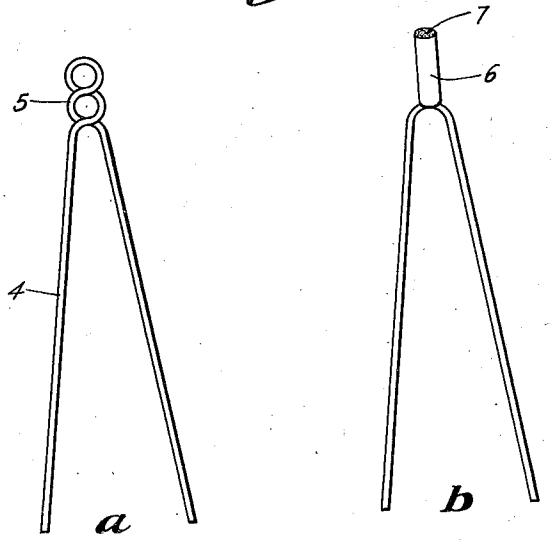


Fig. 2



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INCANDESCENT CATHODE

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4 Claims. (Cl. 250—27.5)

The invention relates to a cathode construction preferably determined for cathode ray tubes and permitting the production of a fluorescent spot of small diameter.

For various fields of application of the cathode ray tube for instance for oscillographic operation and television, it is desirable and necessary to obtain a possibly circular fluorescent spot of small diameter. Since the luminous spot in most cases, and even as a rule in the gas filled cathode ray tube, represents an electron-optical picture of the emitting surface of the cathode, this requirement demands that the part of the cathode surface of active emission should be as small as possible.

In cathode ray tubes, cathodes are used for direct as well as indirect heating; in the latter case, the heating of the emitting surface is not carried out or only to the smallest degree by Joule heat conduction in this part of the cathode, but by means of heat conduction or heat radiation from a resistance wire heated by the heating current (burner, heating element). The indirectly heated cathodes of the ordinary structure consist of a wire bent in the shape of a hairpin, or loop, at whose point a small quantity of emission active material is provided; besides the short life they have the disadvantage that the shape of the luminous spot is not circular but oval. Indirectly heated cathodes of mainly two shapes are in use; either a metal cylinder is placed over the heating body and is provided at the front with, for instance, a pin shaped attachment covered with emission active mass, or such an attachment is directly fastened to the heating wire for instance by means of welding or a clamping connection. In the first case the cylinder is made of nickel or the like, since metals of a higher melting point are harder to be worked, and require a very high thermic load in order that the oxide applied to the point reaches the emission temperature; the cylinder is however hereby exposed to the danger of being soon destroyed during the operation. In the second case, inconveniences result in that the clamping connection becomes loose in time, or the supporting wire at melting will be reduced in its cross section at some places at which it will soon be caused to break apart.

In accordance with the invention a cathode is produced which is free of these disadvantages, in that an approximately spherical or cylindrical oxide carrier is produced of the same material as that of the heating wires connected thereto. The manufacture of such cathodes is remarkably simple. For instance a wire of molybdenum bent in the shape of a hairpin, or of platinum, or two wire pieces touching each other at the points or twisted at such place are heated for instance in the welding burner up to the softening temperature so that at the point a molten pearl is formed; to the latter a spherical shape may easily be imparted, so that the luminous spot has the desired circular shape. The cupola of this molten pearl is subsequently covered in the known manner with a substance capable of emission for instance earth alkali oxide.

The cathodes produced in accordance with the described method are of distinct advantage over the hitherto customary constructions in various respects; the cross section of the wire ends is not reduced in the vicinity of the place of melting, but is rather increased, so that the danger of fracture does no longer exist at these places. Furthermore, it is readily conceivable that the strength and durability is now decisively greater than in the case of assembled cathodes. Since the entire cathode can be produced of material having a high melting point, a dangerous overheating is no longer to be expected. A special advantage also resides in the possibility of employing platinum as initial material since the latter in view of the favorable adhesion of the oxide layer assures an extremely long life of the cathode. Such cathodes may also be heated by A. C. since the heat inertia of the molten pearl insures a uniform emission.

The drawing shows modes of execution of the invention by way of example. Figure 1*a* represents a wire **1** bent in the shape of a hairpin which may consist for instance of platinum. The wire is heated at the bend whereby the molten pearl designated by **2** in Figure 1*b* is formed whose cupola **3** is subsequently activated in the known manner.

In Figure 2*a* the wire **4** is twisted at the point **5**. After melting, a cylinder **6** is formed at this place as shown in Fig. 2*b*, whose covering surface **7** represents the emitting surface.

Having thus described the invention, what we claim is:

1. The method of fabricating electronic emitters adapted to produce substantially point-source electronic emission, which comprises the steps of bending a conducting element into a substantially hairpin shape, convoluting the apex of said bent conductor into a predetermined shape, heating said convolutions to form a bead of predetermined design, and positioning electron emitting material upon a portion of the formed bead.

2. The method of fabricating filamentary electronic emitters adapted to produce substantially point-source electronic emission which comprises the steps of bending a filamentary member into substantially hairpin shape, forming a loop at the apex of said bent filamentary member, heating the formed loop portion to produce a globule thereof, and positioning electron emitting material upon a portion of the produced globule.

3. The method of fabricating filamentary electronic emitters adapted to produce substantially point-source electronic emission which comprises the steps of bending the filamentary member into a substantially hairpin shape, forming a plurality of loops at the apex of said bent filamentary member, applying heat to the loop portions formed to produce a substantially cylindrical bead thereof, and positioning electron emitting material upon a portion of the produced cylindrical bead.

4. A heated electronic emitter adapted to produce point source emission, comprising a filamentary member of substantially hairpin shape, a spherical welded bead member integral with the bight of said filamentary member, and an electron emitting material supported upon a portion of the bead member.

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