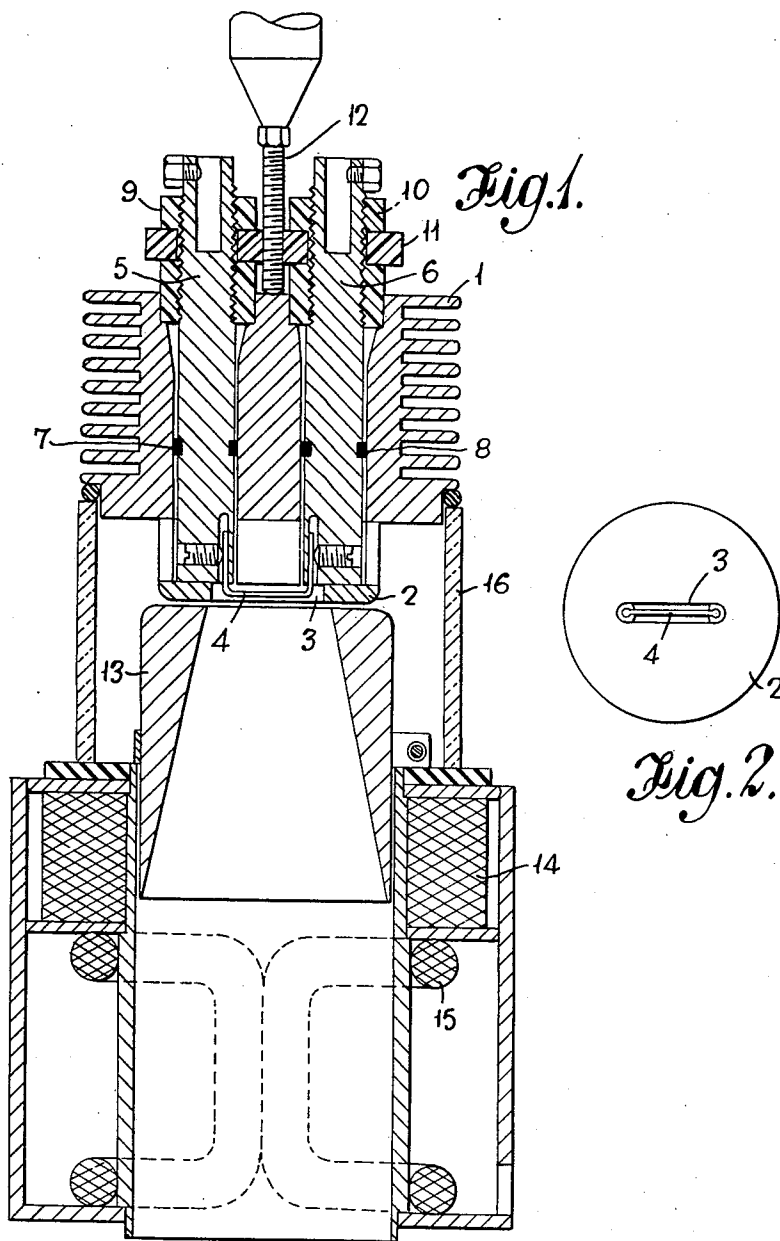


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ELECTRON GUN ASSEMBLIES

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ELECTRON GUN ASSEMBLIES

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This invention relates to electron gun assemblies particularly where large beam currents, of the order of 250 milliamps or more, are required. The invention has application in the use of focused electron beams to produce intense localised heating of a bombarded object.

According to the present invention an electron gun assembly comprises a metal member having a slit, a filamentary cathode wire extending longitudinally of the slit, and means for moving said wire into and out of the slit transversely to the surface of the member to control the magnitude of the electron emission.

The cathode wire may extend between two posts each supported so as to be slidable in a direction extending transversely of the surface of the member. The posts may be mounted in holes in a block secured to said member.

In order that the invention may be more fully understood reference will now be made to the drawing accompanying this specification, in which:

FIG. 1 shows one embodiment of the invention in section; and

FIG. 2 shows a view of the cathode unit.

Referring now to FIG. 1 there is shown therein an electron gun assembly comprising a cathode unit formed by a metal block 1 having lateral fins to facilitate cooling by air blast and which is capped by a metal member 2 in the form of a disc having a slit 3 in which is positioned a filamentary cathode wire 4 extending longitudinally of the slit. In FIG. 2 the cathode wire 4 and slit 3 are shown more clearly. Block 1 can be constructed of brass and member 2 of copper. While block 1 is illustrated as being finned to facilitate air blast cooling, any other method of cooling could equally well be used, bearing in mind that the structure is at a high potential relative to earth.

In order to control the magnitude of the electron emission from cathode wire 4 means are provided for moving the wire into and out of the slit transversely to the surface of copper disc 2. To achieve this the cathode wire is arranged to extend between two posts 5 and 6 which are mounted in holes in block 1 so as to be slidable in a direction extending transversely to the surface of member 2. The filament heater current is passed between the posts and they are each electrically insulated from block 1 by means of recessed O rings 7 and 8 which serve as spacers and vacuum seals. Rings 7 and 8 can conveniently be formed of "neoprene." The space above

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the rings may be oil-filled. Nuts 9 and 10 constructed of an insulating material such as Tufnol are screwed on to screw threads provided on the posts and are a sliding fit in counter-bores provided in block 1. The posts 5 and 6 are held relative to each other by means of an insulating cross piece 11 and the nuts 9 and 10. Cross piece 11 can be formed from Bakelite. The posts may be moved axially by rotation of an insulated screw 12 which is threaded through cross head 11 and bears against the top of modulator block 1. Maximum electron current is obtained when filament 4 is positioned well forward in slit 3 and rotation of screw 12 to withdraw the filament into the disc reduces the beam current.

The assembly also includes a metal accelerating anode 13 positioned so as not to intercept any part of the electron beam, a beam focusing coil 14 and beam deflecting coils 15. The anode structure is closely spaced from the cathode unit but is held insulated therefrom by means of a glass cylinder 16. It will be appreciated that the guns would be operated in a vacuum enclosure.

One advantage of such an electron gun assembly is that where more than one gun is used from the same power supply independent beam current control can be effected by controlling the position of the cathode wire of each assembly without necessity for the adjustment of the filament current or the anode voltage of individual guns. Furthermore it is not necessary to match the filament of each gun in the event of failure of one of them.

What I claim is:

1. An electron gun assembly comprising a hollow block, a metallic member having a slit capping one end of the block, a pair of posts extending within said block, a filamentary cathode wire extending between said posts longitudinally of said slit, means for moving said posts in unison in a direction perpendicular to the surface of said metallic member so as to cause said wire to move into and out of said slit, whereby to control the electron emission, and external electrical connections to said posts to enable heating current to be passed through said wire.

2. An electron gun assembly comprising a hollow block, a metallic member having a slit capping one end of the block, a pair of posts extending within said block perpendicularly to the surface of said metallic member, a filamentary cathode wire detachably secured between said posts and extending longitudinally of said slit, means for moving said posts axially in unison so as to cause said wire to move into and out of said slit, whereby to control the electron emission, and external electrical connections to said posts to enable heating current to be passed through said wire.

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