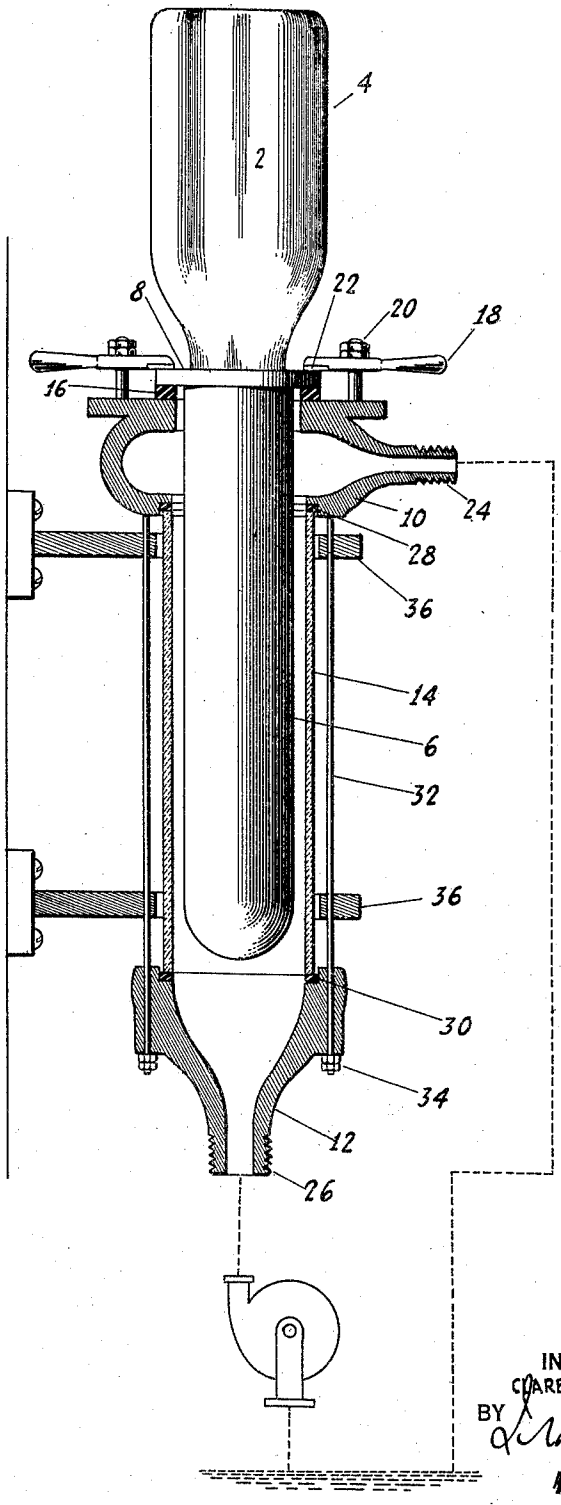
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COOLING OF ELECTRON EMISSION TUBES

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COOLING OF ELECTRON EMISSION TUBES

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This invention relates to the cooling of electron emission tubes, and more particularly to a transparent cooling jacket therefor.

In order to dissipate the large amount of heat generated by electron bombardment in large sized electron emission tubes it has been found necessary to employ fluid cooling, and even with its use tubes have frequently burned out. It is an object of my invention to provide a cooling jacket for study of the cause of these tube burn-outs, which I do by making a portion of the cooling jacket transparent for observation of the operating conditions in the cooling chamber.

As a result of the use of such a cooling jacket it has been found that tube destruction is largely caused by the reduced heat transfer resulting from a deposit of scale on the cooling surface of the tube. It has further been found that in many cases, contrary to the results anticipated by computation, cooling water in the jacket is brought to the boiling point, and that boiling is the cause of rapid scaling. In some cases, owing to failure of the fluid circulating system there has even been a stoppage of fluid supply, resulting in destruction of the tube. In addition, in those stations where the precaution of occasionally inspecting the tubes was taken, breakage frequently occurred during the necessary handling of the tubes. Accordingly, it is a further object of my invention to make possible, during operation, a regular inspection of the interior of the cooling chamber so that station attendants may directly observe the continued presence of cooling fluid, the absence of boiling, and the growth of scale. This I do by using transparent cooling jackets, although originally intended for experiment, as regular equipment on all transmitters.

The specification is accompanied by a drawing the single figure of which is a cross-section through a preferred form of my invention.

Referring to the drawing there is indicated an electron emission tube 2 having an upper glass portion 4 and a substantially cylindrical anode 6 which are sealed together at a ring 8 to form a tube envelope of which the anode 6 is the cooling portion. The cooling jacket for the tube comprises an upper head 10, a lower head 12, and a cylinder 14, made of transparent glass. The tube 2 is inserted in the upper head, and rests upon a gasket 16, against which its sealing ring 8 is clamped by means of clamping levers 18. Each of the levers 18 is pivoted on a bolt 20, and has a tapered end 22 which, for a proper setting of the bolt 20, produces a desired clamping pressure when the lever is swung into clamping position.

The glass cylinder 14 is positioned between the upper and lower heads through intermediate gaskets 28 and 30. The heads are drawn together by means of tension rods 32, which are formed integrally with the upper head, but which at their lower ends are provided with threads for the clamping nuts 34. The jacket is mounted by means of arms 36, to which the clamping rods 32 are fixed.

The upper and lower heads 10 and 12 are each provided with threaded nipples 24 and 26, to which the fluid circulating system is connected.

The modification shown permits inspection of almost all of the cooling chamber, but if desired, alternative forms may be provided in which only a lesser portion is made transparent. The shape of the cooling jacket will depend to some extent upon the shape of the tube which it is to enclose.

It is therefore to be understood that the foregoing modification is by way of illustration and not limitation of my invention, which I claim is:

The combination with an electron emission tube having as part of its envelope a substantially cylindrical metallic anode, of an elongated jacket spaced therefrom for keeping

cooling liquid directly in contact with said anode and providing an unobstructed space between said jacket and said anode for the reception of the cooling liquid, said jacket comprising a transparent glass cylinder in order to facilitate inspection and make possible constant observation of the conditions in the cooling chamber during operation, and clamping heads at both ends of said elongated transparent jacket for clamping said tube thereto.

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