

[54] **GAS-FILLED IONIZATION COUNTER**

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[58] Field of Search **313/54, 93; 250/83.6**

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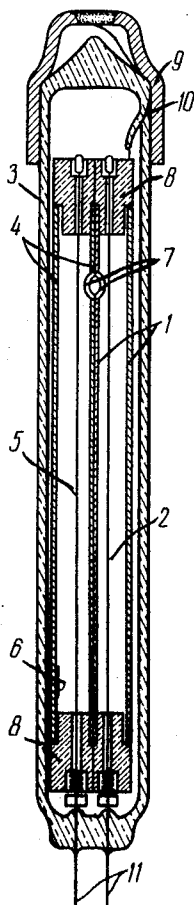
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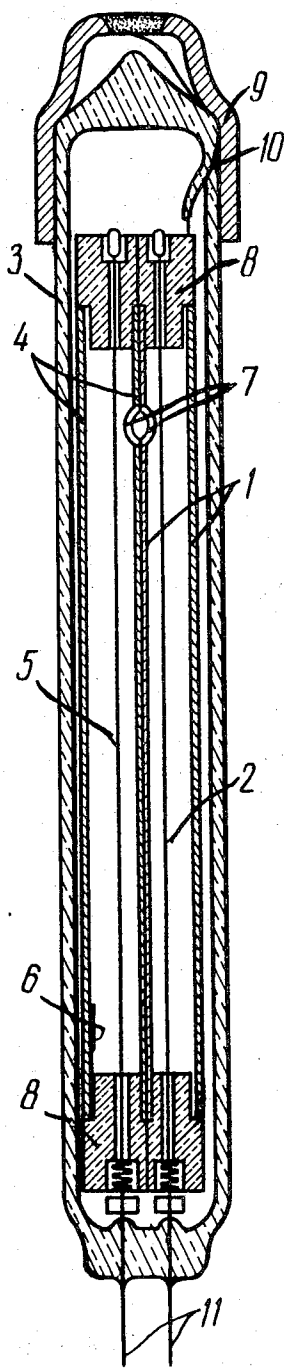
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[57] **ABSTRACT**

A gas-filled ionization counter in which the cathode and anode are placed in an envelope filled with a gaseous mixture and form the main gas-discharge gap and which has a performance check facility. The said facility comprises electrodes placed in the gaseous mixture of the envelope and forming an auxiliary gap, and a radio-active source of specified activity, placed in the auxiliary gap so that its own radiation induces a gas discharge solely in the auxiliary gap. All this provided a check on the stability of the counter's characteristics in service.

2 Claims, 1 Drawing Figure





GAS-FILLED IONIZATION COUNTER

The present invention relates to gas-filled counters, and more specifically to gas-filled ionization counters for use in stationary or portable dosimetric or radiometric equipment to register ionizing radiation in locations including those difficult of access.

There exist gas-filled ionization counters having a cathode and an anode placed in a gas-filled envelope and forming a gas-discharge gap.

The cited radiation counters do not provide a check on the stability of their characteristics in service. For a check on their performance, these counters have to be irradiated from additional reference radioactive sources using remotely controlled blanker devices.

A particular object of the present invention is to provide a gas-filled ionization counter that provides for a check on the stability of its characteristics in service.

This object is accomplished by the fact that a gas-filled ionization counter, having a cathode and anode placed in an envelope filled with a mixture of gases and forming a gas-discharge gap, is fitted, according to the invention, with a performance-check facility comprising electrodes placed in the gaseous mixture of the envelope and forming an auxiliary gas-discharge gap, and a radio-active source of specified activity, placed in the auxiliary gas-discharge gap so that its own radiation induces a gas discharge solely in the auxiliary gap.

It is preferable that the cathode and one of the electrodes of the performance-check facility have openings positioned relative to one another so that the radiation from the gas-discharge induced in the auxiliary gap will pass through the said openings into the main gas-discharge gap and induce a gas discharge there.

Owing to this arrangement, there is a marked improvement in the accuracy of measurements and also in the reliability of the associated dosimetric or radiometric equipment.

The invention will be best understood from the following description of a preferred embodiment when read in connection with the accompanying drawing which shows a longitudinal cross-section through the gas-filled ionization counter disclosed herein.

Referring to the drawing, there is a gas-filled ionization counter comprising a cathode 1 and an anode 2, placed inside a vacuum-tight glass envelope 3 filled with a gaseous mixture composed of neon with additions of argon, chlorine, bromine or oxygen. The cathode 1 and the anode 2 form the main gas-discharge gap.

The counter disclosed herein also incorporates a performance-check facility comprising electrodes a cathode 4 and an anode 5, and also a radio-active source of specified activity. The cathode 4 and the anode 5 are placed in the gaseous mixture of the envelope 3 and form an auxiliary gas-discharge gap. A radio-active source 6 is placed in the auxiliary gas-discharge gap so that its own radiation induces a gas discharge solely in the auxiliary gap. In the counter disclosed herein, the source 6 is placed opposite one of the end faces of the cathode 4. The source 6 is a beta-particle emitter. Use may also be made of an alpha-particle emitter.

The cathode 1 and one of the electrodes in the per-

formance check facility, in our case the cathode 4, have openings 7 positioned relative to one another so that the radiation from the gas discharge induced in the auxiliary gap passes through the said openings 7 into the main gas-discharge gap, inducing a gas discharge there. The openings 7 are arranged coaxially opposite the end face of the cathode 4 near which the radioactive source 6 is located.

The cathode 1 and 4, electrically connected to each other, have the shape of hollow cylinders set up on ceramic insulators 8. The cathodes 1 and 4 are electrically connected also to the base 9 by means of a lead 10. The anodes 2 and 5, made in the form of filaments, are arranged along the axes of the cylinders anchored in the insulators 8, and have leads 11.

The gas-discharge ionization counter disclosed herein operates as follows.

When the working voltages are applied to the cathode 1 and anode 2, the cathode 4 and anode 5, the nuclear radiation emitted by the source 6 induces a pulse gas discharge between the cathode 4 and the anode 5 in the auxiliary gap, at a frequency dependent on the frequency of the radio-active decay in the source 6, which is in turn decided by the specified activity of that source.

Through the openings 7, the radiation of the gas discharge induced in the auxiliary gap passes into the main gap where it induces a gas discharge between the cathode 1 and the anode 2 at the same frequency as that in the auxiliary gap, which is registered by a dosimetric or radiometric instrument (not shown in the drawing).

A check on the stability of the counter's characteristics in service is effected by comparing the registered frequency of the gas-discharge pulses in the main gap with that of the radio-active decay of the source 6 in the auxiliary gap.

The gas-filled ionization counter disclosed herein provides a check on the stability of its characteristics in service, improves the reliability of the associated dosimetric or radiometric equipment, and enhances the accuracy of measurements.

What is claimed is:

1. A gas-filled ionization counter, comprising: an envelope filled with a gaseous mixture; a cathode being positioned in said envelope; an anode being positioned in said envelope, said cathode and anode jointly forming a main gas-discharge gap; and a performance-check facility having a radio-active source of specified activity being positioned in said envelope; the electrodes of said performance-check facility being located in the gaseous mixture of said envelope and forming an auxiliary gas-discharge gap; the radio-active source of said performance-check facility extending into the auxiliary gap so that its own radiation induces a gas discharge solely in the auxiliary gap.

2. A gas-filled ionization counter, as claimed in claim 1, in which said cathode and one of said electrodes in said performance-check facility have openings positioned relative to one another so that the radiation of the gas discharge induced in the auxiliary gap passes through said openings into the main gas-discharge gap and induce a gas discharge there.

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