

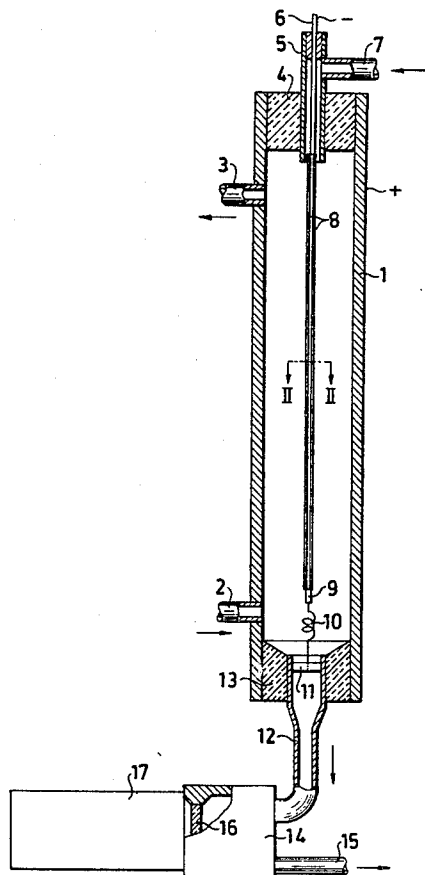
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[33] **Sweden**
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[54] **LIQUID-RINSED PRECIPITATION ELECTRODE
FOR A DEVICE FOR PRECIPITATING AND
COLLECTING CHARGED PARTICLES FROM A
GAS**
4 Claims, 2 Drawing Figs.

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250/435, 250/715, 250/102, 55/120, 55/151
[51] Int. Cl. G01t 1/20
[50] Field of Search 250/71.5,
83, 43.5FT, R; 55/151, 102, 120

ABSTRACT: The invention is concerned with a device for precipitation and collection of charged particles from a gas on a precipitation electrode. The electrode consists of two parallel vertical wires. Water flows along the electrode and forms a thin film between the wires. The water thus has the dual function of increasing the surface of the electrode and rinsing the wires.



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Fig. 1

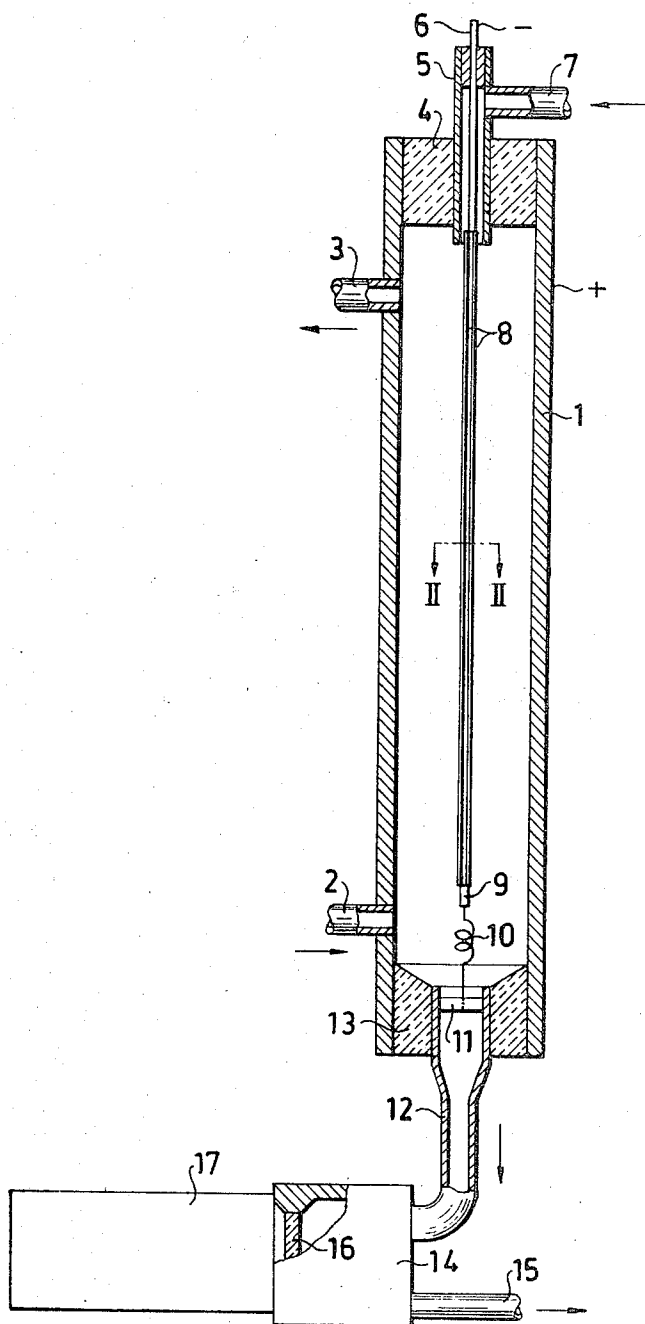
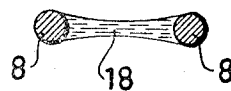


Fig. 2



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LIQUID-RINSED PRECIPITATION ELECTRODE FOR A DEVICE FOR PRECIPITATING AND COLLECTING CHARGED PARTICLES FROM A GAS

The present invention relates to a device for precipitation and collection of charged particles from a gas.

The present invention is especially concerned with precipitation, collection and indication of radioactive particles, for example such particles which escape through leakage caused by damage to a fuel element in a nuclear reactor.

It is previously known that charged particles can be precipitated onto an electrode that has had an electric potential imparted to it, and that such precipitated particles can be transported to a measuring chamber with the aid of a liquid which flows over the electrode.

It is also previously known to manufacture an electrode of his type in the form of a wire along which the liquid flows, or in the form of a porous plate through which the liquid can pass. However, these known types of electrode are accompanied by the disadvantage that it is difficult to effect a continuous, even liquid flow, and that the liquid volume must be kept fairly large, causing a low concentration of precipitated particles in the liquid. The principle object of the present invention is to arrange a device in which the liquid flow is kept absolutely even and at a minimum.

The device according to the present invention thus comprises a chamber with a delivery inlet and an outlet for the gas which carries the charged particles, a precipitation electrode situated in the chamber, a delivery inlet for the supply of a liquid to the precipitation electrode and an outlet for the liquid containing precipitated particles flowing from the precipitation electrode, being characterized in that, the precipitation electrode is comprised of at least two, parallel, vertical or inclined wires the upper ends of which are situated adjacent to the delivery inlet for the liquid which will flow along the precipitation electrode in the form of a liquid film between the wires.

The liquid forms a well-defined film that effectively washes the wires, the liquid moving at an even speed along the wires, utilizing a minimum of liquid to transport the precipitated particles to a measuring chamber.

A preferred feature of the invention is to embody the precipitation electrode with two parallel metal wires, and when the liquid is water, the wires can preferably have a diameter of 0.2—0.5 mm. being arranged at a mutual distance of approximately 2 mm. from each other. The utilization of a plurality of parallel wires is also possible, but no advantage would be gained thereby in respect of the precipitation, but would result in an undesirable increase of liquid flow in relation to the arrangement with two wires.

The invention will now be more closely described with reference to the accompanying drawing, wherein FIG. 1 as an example shows an arrangement according to the invention, FIG. 2 showing in larger scale a section along the line II—II in FIG. 1.

The device according to the drawing comprises a vertical metal pipe 1, which is provided with an inlet 2 and an outlet 3 for a gas. At the upper end the pipe 1 is provided with an end wall 4 of electrically insulating material. Through this end wall extends a tube 5 which is provided with a liquid delivery inlet 7. Centrally through the tube 5 extends a metal rod 6, two metal wires being secured to the lower end of the rod which is at the same level as the lower end of the tube 5. The wires 8

extend parallel to each other and coaxially to the pipe 1, the lower ends of the wires being secured to a short metal rod 9 which is secured to the upper end of a coilspring 10. The lower end of the coilspring 10 being secured by means of a retainer 11 to a conduit 12 which extends through an electrically insulating end wall 13 in the bottom of the pipe 1. The lower end of the conduit 12 is connected to a measuring chamber 14, to which an outlet tube 15 is also connected. One wall of the measuring chamber is devised as a window 16, a photomultiplier 17 being connected to the aforesaid transparent wall.

When the illustrated arrangement is to be used to sense a possible leakage of radio active isotopes from a nuclear reactor, a flow of portative gas containing the radio active isotopes, if any, is introduced through the inlet 2. The metal rod 6 and the metal pipe 1 are then connected to an electric power source so that the metal wires 8 acquire a negative potential. Water is then introduced through the delivery inlet 7 at such a speed that a water film 18, see FIG. 2, is formed between the wires 8 and continuously runs downwards. Such radio active particles which on their decay emit an electron acquire a positive charge and as a result are attracted by the negatively charged precipitation electrode. The water with the thus precipitated particles flowing downwards along the precipitation electrode and out via the conduit 12 into the measuring chamber 14. In the chamber a Cerenkov-radiation is generated dependent upon the emission of a high energy beta or gamma radiation from the radioactive particles. Thereafter the Cerenkov-radiation is registered according to a previously known method by the photomultiplier 17.

In the illustrated case it is preferable to measure the quantity of precipitated particles by means of a Cerenkov-meter. Alternatively the arrangement according to the invention can be combined with, for example, a scintillometer for measurement of the radioactivity in the collected liquid, or generally with every known type of measuring device suitable for the measurement of small quantities of precipitated particles in a liquid.

I claim:

1. A device for precipitation and collection of charged particles from a gas, comprising a chamber with a delivery port and a discharge port for the gas, a precipitation electrode situated within the chamber, a delivery port for delivering a rinsing liquid to the precipitation electrode, and a discharge port for rinsing liquid containing precipitated particles flowing from the precipitation electrode, said precipitating electrode comprising at least two parallel nonhorizontally disposed wires the upper ends of which are so situated adjacent to the liquid-delivery port that the rinsing liquid flows along the wires in the form of a film between the wires.

2. A device according to claim 1, characterized in that the precipitation electrode comprises two metal wires of diameter 0.2—0.5 mm., the wires being situated at a mutual distance of approximately 2 mm.

3. A device according to claim 2, characterized in that the precipitation electrode extends between two electrically insulating end walls in a metal pipe.

4. A device according to claim 1, for measuring radioactive isotopes, wherein the discharge port for the liquid flowing from the precipitation electrode is connected to a measuring chamber provided with a window, a photomultiplier being connected to said window for measuring Cerenkov-radiation generated on decay of the radioactive isotopes.