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(54) **NEUTRON DETECTOR AND DOSE RATE METER USING BERYLLIUM-LOADED MATERIALS**

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(52) **U.S. Cl.**

CPC ***G01T 7/00*** (2013.01); ***G01T 3/00*** (2013.01); ***G01T 3/008*** (2013.01); ***G01T 3/06*** (2013.01)

(58) **Field of Classification Search**

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See application file for complete search history.

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(57) **ABSTRACT**

An apparatus and method for improving the sensitivity and energy response of neutron detectors and neutron dose rate meters. A beryllium layer is added to neutron detector moderators to improve the sensitivity of the detector. Energy dependence of the sensitivity is optimized by controlling the amount of beryllium in the moderator and by specifying the geometrical design parameters. The beryllium layer, in combination with additional material layers in the moderator, makes the detector response function correspond to the theoretical one in a wide range of energies. Response parameters of the neutron dose rate meter are within 20% of the theoretical response function in the neutron energy range from 500 keV to 10 GeV, and also in the energy range corresponding to thermal neutrons (about 1-100 meV).

19 Claims, 6 Drawing Sheets