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(54) **APPARATUS AND METHOD FOR  
DETECTING SLOW NEUTRONS BY LYMAN  
ALPHA RADIATION**

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**G01T 1/04** (2006.01)  
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(52) **U.S. Cl.** ..... **250/473.1; 250/483.1**

(58) **Field of Classification Search** ..... **250/473.1,**  
**250/483.1, 390.01**

See application file for complete search history.

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(57) **ABSTRACT**

A method and apparatus for detecting slow neutrons by moni-  
toring Lyman alpha radiation produced by the <sup>3</sup>He(n,tp)  
nuclear reaction induced by neutrons incident on a gas cell  
containing <sup>3</sup>He or a mixture of <sup>3</sup>He and other atoms and/or  
molecules. Such a method and/or apparatus includes the use  
of, for example, liquid <sup>3</sup>He and <sup>4</sup>He mixtures as a scintillation  
counter for the sensitive detection of neutrons using Lyman  
alpha radiation produced by the <sup>3</sup>He(n,tp) reaction. The radi-  
ation can be detected with high efficiency with an appropriate  
photo-detector, or alternatively, it can be converted to radi-  
ation at longer wavelength by absorption in scintillation mate-  
rials, with the radiation channeled to a photodetector. Be-  
cause of the simplicity of the system and the fact that the  
radiation production mechanisms can be measured and/or  
calculated independently, the method and/or apparatus also  
has the potential for service as a calculable absolute detector.

**18 Claims, 3 Drawing Sheets**

