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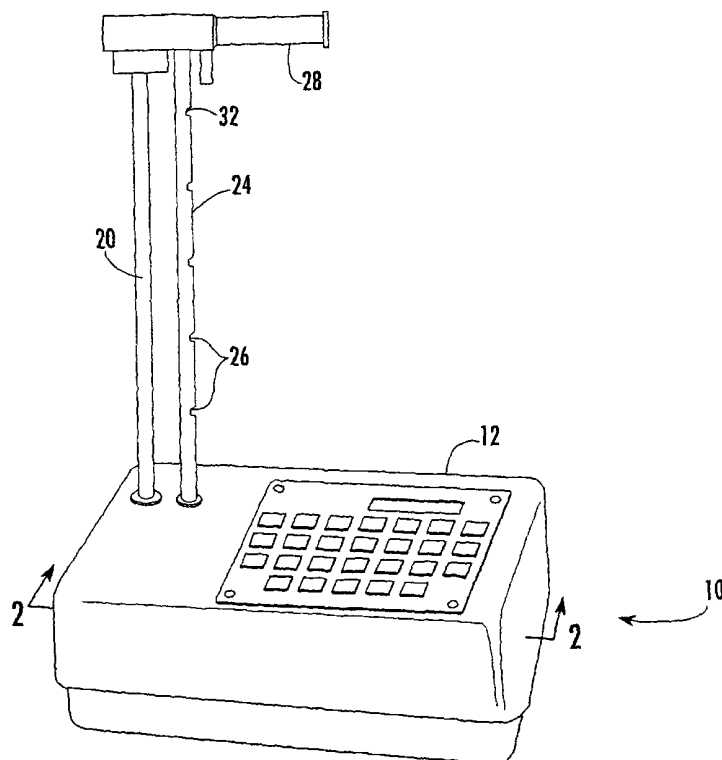
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[Continued on next page]

(54) Title: IMPROVED THIN LAYER NUCLEAR DENSITY GAUGE



(57) Abstract: The present invention provides an improved thin layer nuclear density gauge comprising a gauge housing having a vertical cavity therethrough and a base, a first radiation detector located at a first position within said housing and adjacent to said base of said housing, a second radiation detector located at a second position within said housing and adjacent to said base of said housing, a vertically moveable source rod extending into said cavity of said gauge housing, a radiation source operatively positioned within a distal end of said source rod, at least one bearing operatively positioned to guide said source rod within said cavity, and means for vertically extending and retracting said source rod to a plurality of predetermined source rod positions so as to change the spatial relationship between said radiation source and said first and second radiation detectors. The source rod has a maximum radial movement of less than about 0.003 inch at each predetermined position. The present invention also provides a gauge with an improved radiation shield assembly comprising a sliding block

operatively positioned to move laterally between said first position and said second position, a spring engaging said sliding block and biasing said sliding block into said first position, and a fixed block, said fixed block including a track engaging said sliding block and guiding movement of said sliding block.



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B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

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Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4 749 858 A (YOUNG JAMES E) 7 June 1988 (1988-06-07) column 2; figures 1-5 ---	1
A	WO 98 57269 A (INSTROTEK INC) 17 December 1998 (1998-12-17) page 7, last paragraph -page 9; figures 1-3 -----	1

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4749858 A	07-06-1988	NONE	
WO 9857269 A	17-12-1998	US 5923726 A	13-07-1999
		AU 8066998 A	30-12-1998
		US 6050725 A	18-04-2000
		ZA 9705255 A	25-08-1998