



(51) International Patent Classification:  
**G01N 23/083** (2006.01)

(21) International Application Number:  
PCT/US2010/001643

(22) International Filing Date:  
7 June 2010 (07.06.2010)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:  
61/184,449 5 June 2009 (05.06.2009) US  
61/251,592 14 October 2009 (14.10.2009) US

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(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

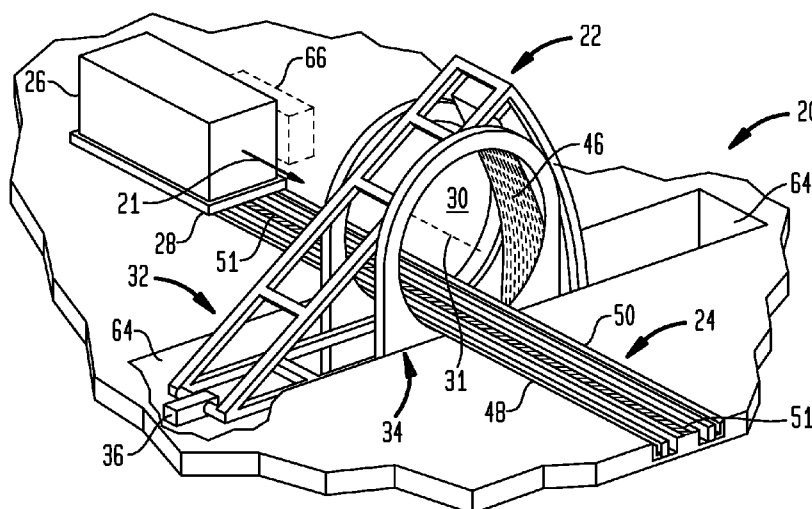
Published:

- with international search report (Art. 21(3))
- with amended claims and statement (Art. 19(1))

[Continued on next page]

(54) Title: TRANSPORTATION CONTAINER INSPECTION SYSTEM AND METHOD

**FIG. 1**



(57) Abstract: In exemplary embodiments of the present invention, containers, such as, for example, those used in transportation and shipping, can be inspected by using a CT X-ray scanning system with a large area detector plate. In exemplary embodiments of the present invention the detector plate can directly convert X-rays transmitted through the container into visible light, thus forming light patterns on the outer surface of the plates. The plates can then be analyzed using, for example, CCO or ICCO cameras and a data processor so as to form real-time and/or 3D images of objects in the container.



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**Date of publication of the amended claims and statement:** 17  
February 2011

## AMENDED CLAIMS

received by the International Bureau on 13 December 2010 (13.12.2010)

82. The inspection system of claim 75, wherein said opening is of a size and shape to allow a transportation container to pass through it.

83. An X-ray detector, comprising:

a plate that directly converts incident X-rays into electromagnetic radiation of a wavelength differing from the wavelength of the X-rays.

84. (new) The detector of claim 83, wherein said incident X-rays are emitted from an X-ray source and are transmitted through at least one object.

85. (new) The X-ray detector of claim 83, further comprising a mirror, arranged to direct said electromagnetic radiation to a sensor.

86. (new) The X-Ray detector of claim 85, wherein said sensor comprises a digital camera arranged to convert the electromagnetic radiation into electrical signals.

87. (new) The X-Ray detector of claim 86, further comprising a data processor to process said electrical signals into at least one image.

88. (new) The X-ray detector of claim 87, wherein said data processor enhances said at least one image so as to allow a viewer to easily distinguish the components of said at least one image and to determine the composition of at least one object depicted in said at least one image.

89. (new) The X-ray detector of claim 84, wherein the X-ray source is one of a standard X-ray tube, a 3MeV linear accelerator, a 6MeV linear accelerator, and a dual 3 MeV/6MeV linear accelerator.

90. (new) The X-ray detector of claim 83, wherein said electromagnetic radiation is one of (i) visible light, (ii) visible light and UV light, (iii) visible light and IR light, (iv) visible light, UV light and IR light, and (vi) visible light in the green region.

91. (new) The X-ray detector of claim 83, wherein said plate comprises a metallic plate with a front surface for receiving X-rays and a rear surface with a phosphor coating.
92. (new) The X-ray detector of claim 91, wherein the metal of which said metallic plate is made has an atomic number greater than or equal to that of iron.
93. (new) A CT scanner, comprising the X-ray detector of claim 83.
94. (new) A CT scanner, comprising the X-ray detector of claim 91.
95. (new) A CT scanner, comprising the X-ray detector of claim 92.
96. (new) The CT scanner of claim 93, wherein multiple scans of at least one object are made by moving the at least one object relative to an X-ray source.
97. (new) The CT scanner of claim 96, further comprising a data processor, wherein 3D images of said at least one object are made from data obtained from said multiple scans.
98. (new) The CT scanner of claim 97, wherein said 3D images are color enhanced by the data processor.
99. (new) An inspection system, comprising:  
a scanner support structure with an opening; and  
a rotor mounted on said scanner support structure, said rotor mounted so as to rotate about an axis of rotation running through the opening, said rotor including:  
an X-ray source, and  
a detector, the detector being positioned to receive X-rays emitted from said X-ray source.
100. (new) The inspection system of claim 99, wherein said detector comprises a plate that directly converts incident X-rays into electromagnetic radiation of a wavelength differing from the wavelength of the X-rays.

101. (new) The inspection system of claim 99, wherein said opening is one of: (i) greater than or equal to 3 meters in diameter, (ii) greater than or equal to 3.5 meters in diameter, (iii) greater than or equal to 4 meters in diameter, (iv) greater than or equal to 5 meters in diameter, (v) less than or equal to 2 meters in diameter and (vi) less than or equal to 1.5 meters in diameter.

103. (new) The inspection system of claim 99, further comprising a data processor for processing the X-rays received by said detector to generate 2D and/or 3D images of at least some of the contents of a container placed in the opening.

104. (new) The inspection system of claim 103, wherein said 2D and/or 3D images are color enhanced by the data processor.

105. (new) The inspection system of claim 104, wherein said color enhancing assigns different colors to objects, as a function of their density.

106. (new) The inspection system of claim 99, further comprising a drive device for moving a container through said opening, a braking system for stopping the rotation of said rotor at each of two stop positions and reversing the direction of rotation of said rotor at each of said stop positions, and moving said container from a first reading position to a second reading position during the deceleration, stopping, and acceleration of said rotor at each of said stop positions.

107. (new) The inspection system of claim 99, wherein said opening is of a size and shape to allow a transportation container to pass through it.

108. (new) The inspection system of claim 100, wherein said detector comprises a coating on said substrate, said coating comprising a mixture of:

a phosphor compound that converts X-rays into electromagnetic radiation of a wavelength differing from the wavelength of said X-rays; and

a protective compound that provides protection to said phosphor.

109. (new) The inspection system of claim 108, wherein said coating further comprises

a reflector compound that amplifies said electromagnetic radiation.

110. (new) The inspection system of claim 108, wherein said phosphor compound is selected from the group consisting of  $\text{CaWO}_4$ ,  $\text{YTbO}_4$ ,  $\text{Gd}_2\text{O}_2\text{S}$  and  $\text{LaOBr}$ .

111. (new) The inspection system of claim 108, wherein said phosphor compound is doped or activated with rare earth elements.

**STATEMENT AND AMENDMENT UNDER PCT ARTICLE 19**

Dear Sir:

In response to the International Search Report and the Written Opinion of the International Searching Authority ("Search Report") mailed on 13 October 2010, applicant hereby submits substitute pages 71-74 of claims.

I. **Summary of Amendments**

Following are the changes to the claims:

Claims 1-82 are unchanged.

New claims 83-111 are added.

The newly added claims are fully supported by the originally-filed application and have added no new matter. Applicant believes new claims 83-111 to be both novel, and to recite an inventive step over the prior art cited in the Search Report.

**Basis for New Claims 83-111**

Support for new claims 83-111 is as follows: page 11, line 23 through page 12, line 33; Figs. 29-31 and page 52, line 22 through page 55, line 15. Additional support is

provided in original claims 61-82. Finally, additional support for new claims 108-111 can also be found at page 24, line 15 through page 30, line 21.

**II. Statement Regarding Claims 12-21, 31-60 and 61-74**

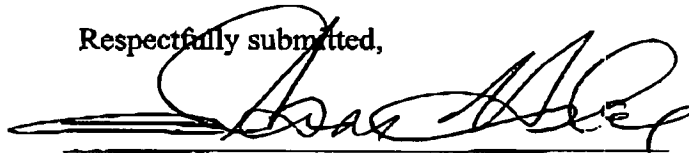
The Search Report carried out no examination of claims 12-21, 31-60 and 61-74, as the International Bureau has deemed these claims to be separate inventions from that of claims 1-11, 22-30 and 75-82.

**III. Statement Regarding Claims 1-11, 22-30 and 75-82**

The Search Report cited Goodenough et al. (US 2008/0292050) and Ozawa et al. (US 2003/0215055) against claims 1-11, 22-30 and 75-82. These references were cited as category "Y" references.

Applicant believes the pending claims to be both novel, and to recite an inventive step over the prior art cited in the Search Report.

Respectfully submitted,



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