Claims

1. An x-ray scanner, comprising:

an x-ray source operable to produce a fan beam of x-rays and to move about a source movement axis;

at least one x-ray detector array having a detector dimension and operable to detect x-rays from the x-ray source along the detector dimension;

a collimator disposed between the x-ray source and the at least one detector array, fixed to the x-ray source, and defining at least one slit to collimate the fan beam of x-rays into a linear x-ray beam, the at least one x-ray detector array being spaced from the x-ray source such that at least one of a height and a width of the linear x-ray beam at the at least one x-ray detector array is no greater than the detector dimension of the at least one x-ray detector array;

an x-ray processing unit operable to process detection of the linear x-ray beam by the at least one x-ray detector array;

a motor controlled by the x-ray processing unit and operable to:

move the x-ray source about the source movement axis to pan the linear x-ray beam and create an x-ray emission cone; and

move the at least one x-ray detector array correspondingly with the x-ray source such that the linear x-ray beam remains aligned with the at least one x-ray detector array;

the x-ray processing unit being operable to form an x-ray scanned image of an object disposed between the collimator and the at least one x-ray detector array within the x-ray emission cone when the linear x-ray beam is panned across the object.

CLAIMS

1. A scanning transmission x-ray imaging system, comprising:

an x-ray source producing x-rays at a focal spot and moving about a source movement axis passing through the focal spot;

at least two x-ray detector arrays each having a detector dimension and detecting x-rays from the x-ray source along the detector dimension;

a collimator disposed between the x-ray source and the at least two detector arrays, fixed to the x-ray source, and defining at least two slits to collimate the x-rays into a set of linear x-ray beams;

the at least two x-ray detector arrays being spaced from the x-ray source such that the linear x-ray beam at each of the at least two x-ray detector arrays has the linear x-ray beam substantially impact within the height and width of a respective one of the at least two x-ray detector arrays;

the at least two x-ray detector arrays moving correspondingly with the x-ray source such that each of the linear x-ray beams remain aligned with a respective one of the at least two x-ray detector arrays.

2. A system according to Claim 1, further comprising an x-ray processing unit processing detection of the linear x-ray beams by the at least two x-ray detector arrays.

3. A system according to Claim 2, further comprising at least one motor controlled by the x-ray processing unit and:

moving the x-ray source about the source movement axis to pivot the linear x-ray beams about the focal spot and create an x-ray emission pyramid; and

moving the at least two x-ray detector arrays correspondingly with the x-ray source such that each of the linear x-ray beams remains aligned with a respective one of the at least two x-ray detector arrays.

4. A system according to Claim 3, in which the x-ray processing unit forms a two-dimensional transmission x-ray image of an object disposed between the collimator and the at least two x-ray detector arrays within the x-ray emission pyramid when the linear x-ray beams are panned across the object.

5. A system according to Claim 1, in which the at least two x-ray detector arrays are two horizontally disposed x-ray detector arrays, one moving horizontally and one moving vertically.

6. A system according to Claim 1, in which the at least two x-ray detector arrays are two horizontally disposed x-ray detector arrays, one vertically disposed and moving horizontally and one horizontally disposed and moving horizontally.

7. A system according to Claim 3, in which the x-ray processing unit moves the x-ray source with a variable speed to optimize x-ray exposure for different portions of the object being scanned.

8. A scanning transmission x-ray imaging system, comprising:

a stationary x-ray source producing x-rays at a focal spot and defining a source focal spot axis passing through the focal spot;

at least one x-ray detector array having a detector dimension and detecting the x-rays from the x-ray source along the detector dimension;

a collimator moving about the source focal spot axis, being disposed between the x-ray source and the at least one detector array, and defining at least one slit to collimate the x-rays into a linear x-ray beam having a height and a width;

the at least one x-ray detector array being spaced from the x-ray source such that the linear x-ray beam substantially impacts within the detector dimension of the at least one x-ray detector array, the at least one x-ray detector array moving correspondingly with the collimator such that the linear x-ray beam remains aligned with the at least one x-ray detector array.

9. A system according to Claim 8, further comprising an x-ray processing unit processing detection of the linear x-ray beam by the at least one x-ray detector array.

10. A system according to Claim 9, further comprising at least one motor controlled by the x-ray processing unit and:

moving the collimator about the source focal spot axis to, thereby, move the linear x-ray beam and create an x-ray emission pyramid; and

move the at least one x-ray detector array correspondingly with the collimator such that the linear x-ray beam remains aligned with the at least one x-ray detector array;

11. A system according to Claim 10, in which the x-ray processing unit forms a two-dimensional transmission x-ray image of an object disposed between the collimator and the at least one x-ray detector array within the x-ray emission pyramid when the linear x-ray beam is panned across the object.

12. A system according to Claim 10, in which the x-ray processing unit moves the x-ray source with a variable speed to optimize x-ray exposure for different portions of the object being scanned.

13. A scanning transmission x-ray imaging system, comprising:

an x-ray source producing x-rays at a focal spot and moving about a source movement axis passing through the focal spot;

at least two x-ray detector arrays each having a detector dimension and detecting x-rays from the x-ray source along the detector dimension;

a horizontal platform under which is disposed one of the at least two x-ray detector arrays, the platform being substantially x-ray transparent;

a collimator disposed between the x-ray source and the at least two detector arrays, fixed to the x-ray source, and defining at least two slits to collimate the x-rays into a set of linear x-ray beams;

the at least two x-ray detector arrays being spaced from the x-ray source such that the linear x-ray beam at each of the at least two x-ray detector arrays has the linear x-ray beam substantially impact within the height and width of a respective one of the at least two x-ray detector arrays; and

the at least two x-ray detector arrays moving correspondingly with the x-ray source such that each of the linear x-ray beams remain aligned with a respective one of the at least two x-ray detector arrays.

14. A system according to Claim 13, further comprising an x-ray processing unit processing detection of the linear x-ray beams by the at least two x-ray detector arrays.

15. A system according to Claim 14, further comprising at least one motor controlled by the x-ray processing unit and:

moving the x-ray source about the source movement axis to pivot the linear x-ray beams about the focal spot and create an x-ray emission pyramid; and

moving the at least two x-ray detector arrays correspondingly with the x-ray source such that each of the linear x-ray beams remains aligned with a respective one of the at least two x-ray detector arrays.

16. A system according to Claim 15, in which the x-ray processing unit forms a two-dimensional transmission x-ray image of an object disposed between the collimator and the at least two x-ray detector arrays within the x-ray emission pyramid when the linear x-ray beams are panned across the object.

17. A system according to Claim 13, in which the at least two x-ray detector arrays are two horizontally disposed x-ray detector arrays, one moving horizontally and one moving vertically.

18. A system according to Claim 13, in which the at least two x-ray detector arrays are two horizontally disposed x-ray detector arrays, one vertically disposed and moving horizontally and one horizontally disposed and moving horizontally.

19. A system according to Claim 15, in which the x-ray processing unit moves the x-ray source with a variable speed to optimize x-ray exposure for different portions of the object being scanned.