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Radiography system

Abstract

A radiography system includes a radiation source that emits radiation, an electronic cassette that receives the radiation and detects a radiographic image, a portable first retainer that holds the electronic cassette, a string that is attached to the first retainer, and a camera that images the string. The first retainer includes a lock portion and a movable portion as an inclination change mechanism that can change an inclination of the electronic cassette with respect to the radiation source. The string and the camera constitute a first detection mechanism that detects an inclination of the electronic cassette about an X-axis which intersects a Z-axis and is directed toward the radiation source in a case in which a radiation detection surface of the electronic cassette and the radiation source are disposed to face each other.

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Background/Summary

CROSS-REFERENCE TO RELATED APPLICATIONS

(1) The present application claims priority under 35 U.S.C. § 119 to Japanese Patent Application No. 2022-005637, filed on Jan. 18, 2022. The above application is hereby expressly incorporated by reference, in its entirety, into the present application.

BACKGROUND

1. Technical Field

(2) The technology of the present disclosure relates to a radiography system.

2. Description of the Related Art

(3) A radiography system has been proposed which can perform radiography not only in a limited environment, such as a medical facility, but also in a special environment, such as the site of an accident, the site of a disaster, or a camp in a conflict area. For example, JP5735725B discloses a radiography system including a radiation source that emits radiation, a radiographic image detector that receives the radiation and detects a radiographic image, a tripod that holds the radiation source, and a tripod that holds the radiographic image detector.

(4) The radiography system disclosed in JP5735725B is provided with a sensor that detects the relative positions of the radiation source and the radiographic image detector (referred to as an "orientation sensor", an "orientation transceiver", or the like in JP5735725B) in preparation for a case in which the radiation source and the radiographic image detector are installed in a special environment and the relative positions thereof deviate from each other. In JP5735725B, it is possible to adjust the relative positions of the radiation source and the radiographic image detector on the basis of the output of this sensor.

SUMMARY

(5) In the radiography system disclosed in JP5735725B, the relative positions of the radiation source and the radiographic image detector are detected by the sensor. However, the inclination of the radiographic image detector about a first axis is not detected. Here, the first axis is an axis that intersects a vertical axis and is directed to the radiation source in a case in which a radiation detection surface of the radiographic image detector and the radiation source are disposed to face each other.

(6) In JP5735725B, as described above, the inclination of the radiographic image detector about the first axis is not detected. Therefore, there is a concern that, in a state in which the radiographic image detector is inclined about the first axis, radiography will be performed on a subject in a posture in which a craniocaudal axis is parallel to the vertical axis and a radiographic image in which the subject is obliquely captured will be detected, resulting in a failure in radiography. In particular, in many cases, the installation surface is uneven in a special environment such as the site of an accident, the site of a disaster, or a camp in a conflict area, and the radiographic image detector is likely to be inclined about the first axis. Therefore, there is an increasing concern that radiography will fail due to the performance of the radiography in a state in which the radiographic image detector is inclined about the first axis.

(7) One embodiment according to the technology of the present disclosure provides a radiography system that can reduce a concern that radiography will fail due to the performance of the radiography in a state in which a radiographic image detector is inclined about a first axis.

(8) According to an aspect of the present disclosure, there is provided a radiography system

comprising: a radiation source that emits radiation; a radiographic image detector that receives the radiation and detects a radiographic image; a portable retainer that holds the radiographic image detector and includes an inclination change mechanism which is capable of changing an inclination of the radiographic image detector with respect to the radiation source; and a first detection mechanism that detects an inclination of the radiographic image detector about a first axis which intersects a vertical axis and which is directed toward the radiation source in a case in which a detection surface for the radiation in the radiographic image detector and the radiation source are disposed to face each other.

(9) Preferably, the radiography system further comprises a first processor, and the first processor performs control to display the inclination of the radiographic image detector about the first axis on a display.

(10) Preferably, the first processor calculates an amount of displacement of the inclination change mechanism for reducing deviation of the inclination of the radiographic image detector about the first axis on the basis of the inclination of the radiographic image detector about the first axis and performs control to display the calculated amount of displacement on the display.

(11) Preferably, the first detection mechanism includes a string that hangs down in a direction parallel to the vertical axis and a first camera that images the string, and the first processor analyzes an image including the string captured by the first camera to detect the inclination of the radiographic image detector about the first axis.

(12) Preferably, the first camera is provided in the radiation source.

(13) Preferably, the first detection mechanism includes an acceleration sensor, and the first processor detects the inclination of the radiographic image detector about the first axis on the basis of a measurement result of the acceleration sensor.

(14) Preferably, the radiography system further comprises a second detection mechanism that detects an inclination of the radiographic image detector about at least one of the vertical axis or a second axis which intersects the vertical axis and the first axis.

(15) Preferably, the radiography system further comprises a second processor. The second processor performs control to display the inclination of the radiographic image detector about the at least one of the vertical axis or the second axis on a display.

(16) Preferably, the second processor calculates an amount of displacement of the inclination change mechanism for reducing deviation of the inclination of the radiographic image detector about the at least one of the vertical axis or the second axis on the basis of the inclination of the radiographic image detector about the at least one of the vertical axis or the second axis and performs control to display the calculated amount of displacement on the display.

(17) Preferably, the second detection mechanism includes at least three markers that are provided in the radiographic image detector or the retainer and a second camera that images the markers, and the second processor analyzes an image captured by the second camera to detect the inclination of the radiographic image detector about the at least one of the vertical axis or the second axis.

(18) Preferably, the second processor analyzes the image captured by the second camera to further detect a distance from a generation point of the radiation to the detection surface of the radiographic image detector and a position of the radiographic image detector with respect to an irradiation center of the radiation in a plane configured by the vertical axis and the second axis.

(19) Preferably, the second camera is provided in the radiation source.

(20) Preferably, the retainer includes a holder to which the radiographic image detector is attached and at least three leg portions that support the holder.

(21) Preferably, in a case in which the second detection mechanism includes the markers, the markers are provided in the holder.

(22) Preferably, the retainer includes a fixing mechanism that fixes a positional relationship between the holder and the leg portions.

(23) According to the technology of the present disclosure, it is possible to provide a radiography

system which can reduce a concern that radiography will fail due to the performance of the radiography in a state in which a radiographic image detector is inclined about a first axis.

Description

BRIEF DESCRIPTION OF THE DRAWINGS
(1) Exemplary embodiments according to the technique of the present disclosure will be described in detail based on the following figures, wherein:
(2) FIG. **1** is a diagram illustrating a radiography system;
(3) FIG. **2** is a diagram illustrating an electronic cassette and a first retainer;
(4) FIG. **3** is a plan view illustrating the first retainer as viewed from a Z-axis direction;
(5) FIG. **4** is a block diagram illustrating an internal configuration of a console;
(6) FIG. **5** is a diagram illustrating an image captured by a camera and a processing unit of a CPU of the console;
(7) FIG. **6** is a diagram illustrating an aspect in which an inclination of an electronic cassette about an X-axis is detected;
(8) FIG. **7** is a diagram illustrating an aspect in which an amount of displacement reducing the deviation of the inclination of the electronic cassette about the X-axis is calculated;
(9) FIG. **8** is a diagram illustrating a first notification screen;
(10) FIG. **9** is a diagram illustrating an aspect in which an inclination of the electronic cassette about a Y-axis is detected;
(11) FIG. **10** is a diagram illustrating an aspect in which an inclination of the electronic cassette about a Z-axis is detected;
(12) FIG. **11** is a diagram illustrating an aspect in which an amount of displacement for reducing the deviation of the inclination of the electronic cassette about the Y-axis is calculated;
(13) FIG. **12** is a diagram illustrating a second notification screen;
(14) FIG. **13** is a diagram illustrating an aspect in which an SID is detected;
(15) FIG. **14** is a diagram illustrating an aspect in which the deviation of the electronic cassette from an irradiation center in a Y-axis direction is detected;
(16) FIG. **15** is a diagram illustrating a third notification screen;
(17) FIG. **16** is a flowchart illustrating a procedure of radiography by the radiography system;
(18) FIG. **17** is a flowchart illustrating the procedure of the radiography by the radiography system;
(19) FIG. **18** is a diagram illustrating the second notification screen on which the amount of displacement for reducing the inclination of the electronic cassette about the Z-axis is displayed;
(20) FIG. **19** is a diagram illustrating an example in which markers are provided in the electronic cassette;
(21) FIG. **20** is a diagram illustrating a second embodiment in which an acceleration sensor is provided as a first detection mechanism; and
(22) FIG. **21** is a diagram illustrating a processing unit of a CPU of a console according to the second embodiment.
DETAILED DESCRIPTION
(23) Hereinafter, an example of an embodiment of the technology of the present disclosure will be described with reference to the drawings. In addition, the terms “first” and “second” used in the specification are added to avoid confusion of components and do not limit the number of components present in a radiography system.
First Embodiment
(24) For example, as illustrated in FIG. **1**, a radiography system **2** is a system that captures a radiographic image of a subject H using radiation R such as X-rays or γ-rays. The radiography system **2** includes, for example, an electronic cassette **10**, a radiation source **11**, a radiation source

control device **12**, and a console **13**. The electronic cassette **10** is held by a portable first retainer **14** and is disposed on an installation surface **15** at an imaging site through the first retainer **14**. The radiation source **11** is also held by a portable second retainer **16** and is disposed on the installation surface **15** at the imaging site through the second retainer **16**. The radiation source control device **12** is directly placed on the installation surface **15**. The imaging site illustrated in FIG. **1** is an imaging site in a special environment, such as the site of an accident or disaster or a camp in a conflict area. The installation surface **15** is uneven.

(25) The electronic cassette **10** is a portable radiographic image detector that outputs a radiographic image corresponding to the radiation R transmitted through the subject H. The electronic cassette **10** is disposed such that a detection surface **17** for the radiation R faces the radiation source **11**. The electronic cassette **10** is connected to the console **13** such that it can communicate with the console **13** wirelessly or in a wired manner. In addition, the electronic cassette **10** is an example of a "radiographic image detector" according to the technology of the present disclosure. Further, in the following description, a vertical axis is referred to as a Z-axis, a first axis which intersects the Z-axis and is directed toward the radiation source **11** in a case in which the detection surface **17** of the electronic cassette **10** and the radiation source **11** are disposed to face each other is referred to as an X-axis, and a second axis which intersects the Z-axis and the X-axis is referred to as a Y-axis. Specifically, the X-axis is a horizontal axis orthogonal to the Z-axis, and the Y-axis is a horizontal axis orthogonal to the Z-axis and the X-axis. Here, the terms "orthogonal" and "horizontal" indicate orthogonal and horizontal including an error (for example, an error of about 1% to 10%), which is generally allowed in the technical field to which the technology of the present disclosure belongs and is not contrary to the gist of the technology of the present disclosure, in addition to perfectly orthogonal and perfectly horizontal. Similarly, the term indicating an angle of "30°", which will be described below, includes an error (for example, an error of about 1% to 10%) which is generally allowed in the technical field to which the technology of the present disclosure belongs and is not contrary to the gist of the technology of the present disclosure.

(26) The electronic cassette **10** has a detection panel in which a plurality of pixels accumulating charge corresponding to the radiation R are arranged in a two-dimensional matrix. The detection panel is also called a flat panel detector (FPD). The electronic cassette **10** has a function of detecting the start and end of the emission of the radiation R. In a case in which the start of the emission of the radiation R is detected, the detection panel starts an accumulation operation of accumulating charge in the pixels. In a case in which the end of the emission of the radiation R is detected, the detection panel starts a reading operation of reading the charge accumulated in the pixels as an electric signal.

(27) In addition, the electronic cassette **10** and the radiation source control device **12** may be connected such that they can communicate with each other, and synchronizing signals indicating the start and end of the emission of the radiation R may be exchanged between the electronic cassette **10** and the radiation source control device **12** to synchronize the emission start timing of the radiation R and the start timing of the accumulation operation and to synchronize the emission end timing of the radiation R and the start timing of the reading operation.

(28) The console **13** is a tablet terminal and is carried by an operator OP such as a radiology technician. The console **13** has a touch panel display **55** (see FIG. **4**) that displays various screens and receives an operation instruction from the operator OP. The touch panel display **55** is an example of a "display" according to the technology of the present disclosure. The console **13** transmits various signals to the electronic cassette **10**. In addition, the console **13** receives a radiographic image from the electronic cassette **10**. The console **13** displays the radiographic image on the touch panel display **55**. The console **13** may be a notebook personal computer.

(29) The console **13** receives an instruction to select an imaging menu for radiography from the operator OP. The imaging menu is a combination of an imaging part, such as the chest or the abdomen, an imaging posture, such as a standing posture or a sitting posture, and an imaging

orientation, such as the front, the back, and the side. A source-to-image receptor distance (SID), which is a distance from a generation point of the radiation R to the detection surface **17** of the electronic cassette **10**, is associated with the imaging menu.
(30) The radiation source **11** has a radiation tube **18** and an irradiation field limiter **19**. The radiation tube **18** is provided with, for example, a filament, a target, and a grid electrode (none of which are illustrated). A voltage is applied between the filament, which is a cathode, and the target, which is an anode. The voltage applied between the filament and the target is called a tube voltage. The filament emits thermoelectrons corresponding to the applied tube voltage to the target. The target emits the radiation R by the collision of the thermoelectrons from the filament. The grid electrode is disposed between the filament and the target. The grid electrode changes the flow rate of the thermoelectrons from the filament to the target according to the applied voltage. The flow rate of the thermoelectrons from the filament to the target is called a tube current. In addition, the above-mentioned generation point of the radiation R is a point at which the thermoelectron collides with the target.
(31) The irradiation field limiter **19** is also called a collimator and limits an irradiation field of the radiation R emitted from the radiation tube **18**. For example, the irradiation field limiter **19** has a configuration in which four shielding plates made of lead or the like that shields the radiation R are disposed on each side of a quadrangle and a quadrangular emission opening for transmitting the radiation R is formed in a central portion. The irradiation field limiter **19** changes the position of each shielding plate to change the size of the emission opening, thereby changing the irradiation field of the radiation R. In addition, in this example, the radiation source **11** is used as a reference for adjusting the position and the posture, and the adjustment of the inclinations of the radiation source **11** about the Y-axis and the Z-axis is unnecessary. Therefore, the emission opening of the irradiation field limiter **19** is always set to the maximum size, and the irradiation field of the radiation R is also always set to the maximum size.
(32) A camera **20** is provided in the irradiation field limiter **19**. The camera **20** is a digital camera that captures a digital image. The camera **20** is connected to the console **13** such that it can communicate with the console **13** wirelessly or in a wired manner. The camera **20** images portions of the electronic cassette **10** and the first retainer **14** in response to an imaging instruction from the console **13**. The camera **20** transmits a captured image **75** (see FIG. **5** and the like) obtained by imaging portions of the electronic cassette **10** and the first retainer **14** to the console **13**. For example, the disposition of the camera **20** is adjusted such that a line LC (see FIG. **14**), which passes through the center (the center of the angle of view) of the captured image **75** and is parallel to the Z-axis, is matched with a line which passes through the irradiation center of the radiation R and is parallel to the Z-axis. The irradiation center of the radiation R is the center of the irradiation field of the radiation R which is defined by the irradiation field limiter **19**. The camera **20** is an example of a “first camera” and a “second camera” according to the technology of the present disclosure.
(33) The instruction to capture the captured image **75** is issued to the camera **20** through the console **13** a total of three times. A first imaging instruction is issued in a case in which the electronic cassette **10** and the radiation source **11** are first installed on the installation surface **15** through the first retainer **14** and the second retainer **16**. A second imaging instruction is issued after the deviation of the inclination of the electronic cassette **10** about the X-axis is reduced on the basis of the captured image **75** captured by the first imaging instruction. A third imaging instruction is issued after the deviation of the inclinations of the electronic cassette **10** about the Y-axis and the Z-axis is reduced on the basis of the captured image **75** captured by the second imaging instruction.
(34) The radiation source **11** is connected to the radiation source control device **12** in a wired manner. In addition, the console **13** is connected to the radiation source control device **12** such that it can communicate with the radiation source control device **12** wirelessly or in a wired manner. The radiation source control device **12** controls the operation of the radiation source **11** in response

to various operation instructions from the console **13**.

(35) The operator OP sets the irradiation conditions of the radiation R in the radiation source control device **12** through the console **13**. The irradiation conditions are a tube voltage applied to the radiation tube **18**, a tube current, and an irradiation time of the radiation R. Approximate values of the irradiation conditions are predetermined by the imaging menu. In addition, the operator OP inputs an instruction to start the emission of the radiation R to the radiation source control device **12** through the console **13**. In a case in which the irradiation start instruction is input from the console **13**, the radiation source control device **12** directs the radiation tube **18** to emit the radiation R under the set irradiation conditions. In a case in which the irradiation time set in the irradiation conditions has elapsed since the start of the emission of the radiation R, the radiation source control device **12** stops the emission of the radiation R from the radiation tube **18**. In addition, the emission of the radiation R may be ended by an auto exposure control (AEC) function. The AEC function is a function that detects the dose of the radiation R during the emission of the radiation R and stops the emission of the radiation R from the radiation tube **18** at the time when an integrated value of the detected dose (cumulative dose) reaches a preset target dose. In this case, the detection panel of the electronic cassette **10** starts the reading operation in a case in which the cumulative dose of the radiation R reaches the target dose. In addition, the irradiation condition may be a tube current-irradiation time product which is a product of the tube current and the irradiation time.

(36) For example, as illustrated in FIG. **2**, the first retainer **14** is a so-called tripod having, for example, a holder **30**, a center pole **31**, a main body portion **32**, and three leg portions **33**A, **33**B, **33**C. The electronic cassette **10** is attachably and detachably attached to the holder **30**. The first retainer **14** is an example of a "retainer" according to the technology of the present disclosure. Further, in the following description, in a case in which the leg portions **33**A to **33**C do not need to be particularly distinguished from each other, they may be collectively referred to as leg portions **33**.

(37) One end of a string **34** is attached to a lower right portion of the holder **30**. A weight **35** is attached to the other end of the string **34**. The string **34** hangs down in a direction parallel to the Z-axis without loosening by the action of the weight **35**. The string **34** may be any object as long as it hangs down in the direction parallel to the Z-axis without loosening. However, it is preferable that the string **34** is made of a material that shields the radiation R in order to facilitate the extraction of an image of the string **34** from the captured image **75**. For example, the string **34** is a lead wire or chain having a thickness of several millimeters and a length of several tens of centimeters. The string **34** is provided to detect the inclination of the electronic cassette **10** about the X-axis with respect to the radiation source **11**. The string **34** and the camera **20** constitute a "first detection mechanism" according to the technology of the present disclosure.

(38) Four markers M**1**, M**2**, M**3**, and M**4** are provided on a surface of the holder **30** that is on the side on which the detection surface **17** of the electronic cassette **10** is disposed. The marker M**1** is disposed at an upper left corner, the marker M**2** is disposed at an upper right corner, the marker M**3** is disposed at a lower left corner, and the marker M**4** is disposed at a lower right corner. Similarly to the string **34**, it is preferable that the markers M**1** to M**4** are made of a material that shields the radiation R in order to facilitate the extraction of an image of the markers M**1** to M**4** from the captured image **75**. For example, the markers M**1** to M**4** are circular lead plates having a diameter of about several centimeters. The markers M**1** to M**4** are provided to detect the inclinations of the electronic cassette **10** about the Y-axis and the Z-axis with respect to the radiation source **11**. The markers M**1** to M**4** and the camera **20** constitute a "second detection mechanism" according to the technology of the present disclosure.

(39) The markers M**1** to M**4** are disposed at positions where a figure formed by lines connecting the centers of the markers M**1** to M**4** is a rectangle in a case in which there is no deviation in the inclination of the electronic cassette **10** with respect to the radiation source **11** about any of the X-axis, the Y-axis, or the Z-axis. That is, the marker M**1** and the marker M**2** are provided at the same

height position with respect to the Z-axis. Similarly, the marker M**3** and the marker M**4** are provided at the same height position with respect to the Z-axis. Further, the marker M**1** and the marker M**3** are provided at the same horizontal position with respect to the Y-axis. Similarly, the marker M**2** and the marker M**4** are provided at the same horizontal position with respect to the Y-axis.

(40) One end of the center pole **31** is connected to the holder **30**, and the other end of the center pole **31** penetrates the main body portion **32** and extends downward. The center pole **31** is connected to a handle **36** by a worm gear consisting of a cylindrical worm and a worm wheel or a rack and pinion gear in the main body portion **32** and can be move up and down in the direction of an arrow with respect to the main body portion **32** by rotating the handle **36**. The height position of the holder **30** and thus the electronic cassette **10** can be adjusted by the vertical movement of the center pole **31**. Graduations are provided on the center pole **31** at intervals of, for example, 1 cm such that the height position of the electronic cassette **10** can be known.

(41) The leg portions **33**A to **33**C have the same configuration and have a base portion **37**, a lock portion **38**, a movable portion **39**, and a ferrule **40** in this order from the main body portion **32**. The base portions **37** are connected to the main body portions **32** at intervals of 120° and can be opened and closed with respect to the main body portions **32**. The lock portion **38** is, for example, a lock nut that is loosened in a case in which it is turned counterclockwise and is tightened in a case in which it is turned clockwise. The movable portion **39** can be expanded and contracted in the direction of the arrow with respect to the base portion **37** in a case in which the lock portion **38** is loosened. Graduations are provided on the movable portion **39**, for example, at intervals of 1 cm such that the amount of expansion and contraction (the amount of displacement) with respect to the base portion **37** can be known. The ferrule **40** is a portion that comes into direct contact with the installation surface **15**. The lock portion **38** and the movable portion **39** are an example of an "inclination change mechanism" according to the technology of the present disclosure. In addition, the lock portion **38** may be a lock lever that has two positions of a lock position and a lock release position.

(42) For example, as illustrated in FIG. **3**, the main body portion **32** is provided with a fixing mechanism **45** for fixing the positional relationship between the holder **30** and the leg portions **33**. The fixing mechanism **45** is a click stop mechanism including a holding portion **46** that holds the center pole **31** therein to be movable up and down, a click ball **47** that can project from and retract into the holding portion **46**, and a rotating portion **48** that is rotated about the holding portion **46** using the center pole **31** as an axis. The rotating portion **48** can be rotated to change the positions of the leg portions **33**A to **33**C. Graduations are provided on the main body portion **32** at intervals of, for example, 1° such that it is possible to know how many degrees the main body portion **32** has been rotated from the original position.

(43) Grooves **49** into which the click ball **47** is fitted are formed in the rotating portion **48** at intervals of 120°. In the case of FIG. **3** which is a plan view of the first retainer **14**, to which the electronic cassette **10** is attached, as seen from the Z-axis direction, the groove **49** is formed at the position where one leg portion **33** (in FIG. **3**, any one of the leg portion **33**C, the leg portion **33**A, or the leg portion **33**B) among the leg portions **33**A to **33**C and the detection surface **17** of the electronic cassette **10** are orthogonal to each other. In addition, in the case of FIG. **3** which is a plan view of the first retainer **14**, to which the electronic cassette **10** is attached, as seen from the Z-axis direction, the grooves **49** are provided at positions where two adjacent leg portions **33** (in FIG. **3**, any of the leg portions **33**A and **33**B, the leg portions **33**B and **33**C, or the leg portions **33**C and **33**A) other than the leg portion **33** at the position orthogonal to the detection surface **17** of the electronic cassette **10** extend in directions that are symmetric with respect to the detection surface **17** of the electronic cassette **10**, specifically, in directions having an angle of 30° from the detection surface **17**. The positional relationship between the holder **30** and the leg portions **33**A to **33**C is always fixed to the above-described state by forming the grooves **49** at these positions. In addition,

the second retainer **16** has the same basic configuration as the first retainer **14** except that the object to be held is changed from the electronic cassette **10** to the radiation source **11**. Therefore, the description thereof will not be repeated.

(44) For example, as illustrated in FIG. **4**, the console **13** comprises a storage **56**, a memory **57**, a central processing unit (CPU) **58**, and a communication interface (I/F) **59** in addition to the touch panel display **55**. The touch panel display **55**, the storage **56**, the memory **57**, the CPU **58**, and the communication I/F **59** are connected to each other through a bus line (not illustrated).

(45) The storage **56** is a hard disk drive that is provided in the computer constituting the console **13** or is connected to the computer through a cable or a network. The storage **56** stores, for example, a control program, such as an operating system, various application programs including an operation program **60**, and various kinds of data associated with these programs. The operation program **60** is an application program for causing the computer to function as the console **13**. In addition, a solid state drive may be used instead of the hard disk drive.

(46) The memory **57** is a work memory used by the CPU **58** to perform processes. The CPU **58** loads the program stored in the storage **56** to the memory **57** and performs a process corresponding to the program. Therefore, the CPU **58** controls the overall operation of each unit of the computer. The CPU **58** is an example of a “first processor” and a “second processor” according to the technology of the present disclosure. In addition, the memory **57** may be provided in the CPU **58**. The communication I/F **59** controls the transmission of various kinds of information to external devices such as the electronic cassette **10**, the radiation source control device **12**, and the camera **20**.

(47) For example, as illustrated in FIG. **5**, in a case in which the operation program **60** is started, the CPU **58** of the computer constituting the console **13** functions as an image analysis unit **70**, a displacement amount calculation unit **71**, and a display control unit **72** in cooperation with the memory **57** and the like.

(48) The captured image **75** from the camera **20** is input to the image analysis unit **70**. The captured image **75** includes, for example, a lower portion of the electronic cassette **10**, the holder **30**, and the string **34**. The image analysis unit **70** analyzes the captured image **75** to detect the inclinations of the electronic cassette **10** about the X-axis, the Y-axis, and the Z-axis. In addition, the image analysis unit **70** analyzes the captured image **75** to detect the SID and the position of the electronic cassette **10** with respect to the irradiation center of the radiation R in a YZ plane configured by the Y-axis and the Z-axis (hereinafter, simply referred to as a position with respect to the irradiation center). The image analysis unit **70** outputs, for example, the detected inclinations of the electronic cassette **10** as an analysis result **76** to the displacement amount calculation unit **71** and the display control unit **72**.

(49) The displacement amount calculation unit **71** calculates the amount of displacement of the movable portion **39** for reducing the deviation of the inclination of the electronic cassette **10** about the X-axis on the basis of the inclination of the electronic cassette **10** about the X-axis in the analysis result **76**. In addition, the displacement amount calculation unit **71** calculates the amount of displacement of the movable portion **39** for reducing the deviation of the inclination of the electronic cassette **10** about the Y-axis on the basis of the inclination of the electronic cassette **10** about the Y-axis in the analysis result **76**. The displacement amount calculation unit **71** outputs a displacement amount calculation result **77** to the display control unit **72**. Here, the amount of displacement of the movable portion **39** for reducing the deviation of the inclination of the electronic cassette **10** is, for example, the amount of displacement for eliminating the deviation. The amount of displacement for eliminating the deviation may include not only the amount of displacement for completely eliminating the deviation but also an error (for example, an error of about 1% to 10%) that is generally allowed in the technical field to which the technology of the present disclosure belongs and is not contrary to the gist of the technology of the present disclosure. Alternatively, the amount of displacement of the movable portion **39** for reducing the

deviation of the inclination of the electronic cassette **10** may be the amount of displacement for making the deviation less than a preset threshold value.

(50) The display control unit **72** performs control to display various screens on the touch panel display **55**. For example, the display control unit **72** performs control to display a first notification screen **90** (see FIG. **8**) including the inclination of the electronic cassette **10** about the X-axis and the amount of displacement of the movable portion **39** for reducing the deviation of the inclination of the electronic cassette **10** about the X-axis on the touch panel display **55**. In addition, the display control unit **72** performs control to display a second notification screen **115** (see FIG. **12**) including the inclinations of the electronic cassette **10** about the Y-axis and the Z-axis and the amount of displacement of the movable portion **39** for reducing the deviation of the inclinations of the electronic cassette **10** about the Y-axis on the touch panel display **55**. Further, the display control unit **72** performs control to display a third notification screen **125** (see FIG. **15**) including the SID and the position with respect to the irradiation center on the touch panel display **55**.

(51) For example, as illustrated as an analysis image **80_1** in FIG. **6**, the image analysis unit **70** extracts an image of the marker M**3**, the marker M**4**, and the string **34** from a captured image **75_1** captured by the first imaging instruction using a well-known image recognition technique. The image analysis unit **70** calculates an angle formed between a line L_M**34** connecting the centers of the markers M**3** and the marker M**4** and a line LS following the string **34**. Then, the image analysis unit **70** detects an angle obtained by subtracting 90° from the calculated angle as an inclination α of the electronic cassette **10** about the X-axis. In a case in which the angle formed between the line L_M**34** and the line LS is less than 90° (acute angle) as illustrated in FIG. **6**, α is a negative value. On the contrary, in a case in which the angle formed between the line L_M**34** and the line LS is greater than 90° (obtuse angle), α is a positive value. In a case in which the angle formed between the line L_M**34** and the line LS is 90°, α is 0°. In this case, there is no deviation in the inclination of the electronic cassette **10** about the X-axis. The image analysis unit **70** outputs the detected inclination α of the electronic cassette **10** about the X-axis as an analysis result **76_1** to the displacement amount calculation unit **71** and the like. FIG. **6** illustrates a case in which the angle formed between the line L_M**34** and the line LS is 80° and α is 80°−90°=−10°.

(52) For example, as illustrated in FIG. **7**, the displacement amount calculation unit **71** calculates the amount of displacement for reducing the deviation of the inclination of the electronic cassette **10** about the X-axis with reference to a displacement amount calculation table **85**. The displacement amount calculation table **85** is stored in the storage **56**. The amount of displacement of the movable portion **39** is registered for each inclination α of the electronic cassette **10** about the X-axis in the displacement amount calculation table **85**. The displacement amount calculation unit **71** reads an amount of displacement corresponding to the inclination α of the electronic cassette **10** about the X-axis included in the analysis result **76_1** from the image analysis unit **70** from the displacement amount calculation table **85** and outputs the read amount of displacement as a displacement amount calculation result **77_1** to the display control unit **72**.

(53) Here, of two leg portions **33** extending in the directions which are symmetric with respect to the detection surface **17** of the electronic cassette **10**, specifically, in the directions having an angle of 30° from the detection surface **17**, the leg portion **33** that is located on the left side of the subject H is referred to as a left front leg portion **33**, and the leg portion **33** that is located on the right side of the subject H is referred to as a right front leg portion **33**. In addition, the leg portion **33** at the position orthogonal to the detection surface **17** of the electronic cassette **10** is referred to as a rear leg portion **33**. In this case, even though the movable portion **39** of the rear leg portion **33** is displaced, the inclination of the electronic cassette **10** about the X-axis is not changed. Therefore, the amounts of displacement of the movable portions **39** of the right front and left front leg portions **33** are registered in the displacement amount calculation table **85**, but the amount of displacement of the movable portion **39** of the rear leg portion **33** is not registered in the displacement amount calculation table **85**. FIG. **7** illustrates a case in which the displacement amount calculation result

77_1 showing that the inclination α of the electronic cassette **10** about the X-axis included in the analysis result **76_1** is −10°, the amount of displacement of the movable portion **39** of the left front leg portion **33** is +8 cm, and the amount of displacement of the movable portion **39** of the right front leg portion **33** is −2 cm is calculated. In addition, in a case in which the movable portion **39** of one of the right front leg portion **33** and the left front leg portion **33** is displaced, the inclination of the electronic cassette **10** about the X-axis is changed. Therefore, only the amount of displacement of the movable portion **39** of one of the right front leg portion **33** and the left front leg portion **33** may be registered in the displacement amount calculation table **85**.

(54) For example, as illustrated in FIG. **8**, the first notification screen **90** displayed on the touch panel display **55** after the first imaging instruction includes an illustration display region **91**, a result display region **92**, and a guide display region **93**. An illustration showing the first retainer **14** to which the electronic cassette **10** is attached and the subject H in a plan view from the Z-axis direction and an illustration showing the electronic cassette **10** and the holder **30** in a plan view from the X-axis direction are displayed in the illustration display region **91**. In the illustration showing the first retainer **14** to which the electronic cassette **10** is attached and the subject H in a plan view from the Z-axis direction, the words "left front", "right front", and "rear" for distinguishing the leg portions **33**A to **33**C are displayed.

(55) The analysis result **76_1** and the displacement amount calculation result **77_1** are displayed in the result display region **92**. Specifically, the inclination α of the electronic cassette **10** about the X-axis and the amount of displacement of the movable portion **39** for reducing the deviation of the inclination of the electronic cassette **10** about the X-axis are displayed in the result display region **92**. A guide indicating how to adjust the length of the movable portion **39** is displayed in the guide display region **93**. In addition, in a case in which α is 0°, the displacement amount calculation result **77_1** is not displayed in the result display region **92**, and a message indicating that the adjustment of the length of the movable portion **39** is not required is displayed.

(56) Further, there may be a case in which the inclination of the radiation source **11** about the X-axis deviates and the line LS following the string **34** is not captured in parallel to the left and right sides of the analysis image **80_1**. In this case, the angle formed between the line LS following the string **34** and the left and right sides of the analysis image **80_1** is calculated as the inclination of the radiation source **11** about the X-axis, and the amount of displacement of the movable portion of the second retainer **16** for reducing the inclination of the radiation source **11** about the X-axis is calculated. Then, the inclination of the radiation source **11** about the X-axis and the amount of displacement of the movable portion of the second retainer **16** for reducing the inclination of the radiation source **11** about the X-axis are displayed on the first notification screen **90** to prompt the operator OP to adjust the length of the movable portion of the second retainer **16**.

(57) An OK button **94** is provided in a lower portion of the first notification screen **90**. The operator OP displaces the movable portion **39** with reference to the graduations on the basis of the display of the result display region **92** and then selects the OK button **94**. In a case in which the OK button **94** is selected, the second imaging instruction is issued. In addition, after the selection of the OK button **94**, in a case in which the deviation of the inclination of the electronic cassette **10** about the X-axis has not been sufficiently reduced, the second imaging instruction is not issued, and the operator OP is prompted to adjust the length of the movable portion **39** again. Here, the case in which the deviation of the inclination of the electronic cassette **10** about the X-axis has not been sufficiently reduced is a case in which the inclination α of the electronic cassette **10** about the X-axis has not been 0° or a case in which the inclination α has not fallen within a preset allowable range having 0° as its center (for example, $-1° < \alpha < +1°$).

(58) For example, as illustrated as an analysis image **80_2** in FIG. **9**, the image analysis unit **70** extracts the image of the markers M**1** to M**4** from a captured image **75_2** captured by the second imaging instruction using a well-known image recognition technique. The image analysis unit **70** calculates the length of a line L_M**12** connecting the centers of the marker M**1** and the marker M**2**

and the length of a line L_M**34** connecting the centers of the marker M**3** and the marker M**4**. Then, the image analysis unit **70** calculates an inclination β of the electronic cassette **10** about the Y-axis using an expression **100** for calculating the inclination β of the electronic cassette **10** about the Y-axis from a ratio L_M**12**/L_M**34** of the length of the line L_M**12** to the length of the line L_M**34**. The expression **100** is an equation that has the ratio L_M**12**/L_M**34** as a variable and β as a solution and is stored in the storage **56**. In a case in which the electronic cassette **10** is inclined to the rear as illustrated in FIG. **9**, the length of the line L_M**12** is smaller than the length of the line L_M**34**, and the ratio L_M**12**/L_M**34** is smaller than 1. In this case, β has a negative value. On the contrary, in a case in which the electronic cassette **10** is inclined to the front, the length of the line L_M**12** is larger than the length of the line L_M**34**, and the ratio L_M**12**/L_M**34** is larger than 1. In this case, β has a positive value. In a case in which the detection surface **17** of the electronic cassette **10** is parallel to the Z-axis, the length of the line L_M**12** is equal to the length of the line L_M**34**, and the ratio L_M**12**/L_M**34** is 1. In this case, β is 0°, and there is no deviation in the inclination of the electronic cassette **10** about the Y-axis. The image analysis unit **70** outputs the calculated β as an analysis result **76_2**A to the displacement amount calculation unit **71** and the like.

(59) Further, for example, as illustrated in FIG. **10**, the image analysis unit **70** calculates the length of a line L_M**13** connecting the centers of the markers M**1** and the marker M**3** and the length of a line L_M**24** connecting the centers of the marker M**2** and the marker M**4** in the analysis image **80_2** of the captured image **75_2** captured by the second imaging instruction. Then, the image analysis unit **70** calculates an inclination γ of the electronic cassette **10** about the Z-axis from a ratio L_M**13**/L_M**24** of the length of the line L_M**13** to the length of the line L_M**24** using an expression **105** for calculating the inclination γ of the electronic cassette **10** about the Z-axis. The expression **105** is an equation that has the ratio L_M**13**/L_M**24** as a variable and γ as a solution and is stored in the storage **56**. In a case in which the electronic cassette **10** is inclined to the left as illustrated in FIG. **10**, the length of the line L_M**13** is larger than the length of the line L_M**24**, and the ratio L_M**13**/L_M**24** is larger than 1. In this case, γ has a negative value. On the contrary, in a case in which the electronic cassette **10** is inclined to the right, the length of the line L_M**13** is smaller than the length of the line L_M**24**, and the ratio L_M**13**/L_M**24** is smaller than 1. In this case, γ has a positive value. In a case in which the detection surface **17** of the electronic cassette **10** is parallel to the Y-axis, the length of the line L_M**13** is equal to the length of the line L_M**24**, and the ratio L_M**13**/L_M**24** is 1. In this case, γ is 0°, and there is no deviation in the inclination of the electronic cassette **10** about the Z-axis. The image analysis unit **70** outputs the calculated γ as an analysis result **76_2**B to the displacement amount calculation unit **71** and the like. In addition, for convenience, the process illustrated in FIG. **9** for calculating the inclination β of the electronic cassette **10** about the Y-axis and the process illustrated in FIG. **10** for calculating the inclination γ of the electronic cassette **10** about the Z-axis have been described separately. However, the image analysis unit **70** performs the processes illustrated in FIGS. **9** and **10** in parallel.

(60) For example, as illustrated in FIG. **11**, the displacement amount calculation unit **71** calculates the amount of displacement for reducing the deviation of the inclination of the electronic cassette **10** about the Y-axis with reference to a displacement amount calculation table **110**. The displacement amount calculation table **110** is stored in the storage **56**. The amount of displacement of the movable portion **39** is registered for each inclination β of the electronic cassette **10** about the Y-axis in the displacement amount calculation table **110**. The displacement amount calculation unit **71** reads an amount of displacement corresponding to the inclination β of the electronic cassette **10** about the Y-axis included in the analysis result **76_2**A from the image analysis unit **70** from the displacement amount calculation table **110** and outputs the read amount of displacement as a displacement amount calculation result **77_2**A to the display control unit **72**.

(61) In a case in which the inclination of the electronic cassette **10** about the Y-axis is changed, it is better to displace only the movable portion **39** of the rear leg portion **33** than to displace both the

movable portions **39** of the right front and left front leg portions **33** by the same amount, in order to reduce the time required for adjustment. Therefore, the amounts of displacement of the movable portions **39** of the right front and left front leg portions **33** are not registered in the displacement amount calculation table **110**, and only the amount of displacement of the movable portion **39** of the rear leg portion **33** is registered in the displacement amount calculation table **110**. FIG. **11** illustrates a case in which the displacement amount calculation result **77_2**A showing that the inclination β of the electronic cassette **10** about the Y-axis included in the analysis result **76_2**A is −10° and the amount of displacement of the movable portion **39** of the rear leg portion **33** is +10 cm is calculated.
(62) The deviation of the inclination of the electronic cassette **10** about the Z-axis is not reduced even in a case in which the movable portion **39** is displaced. Therefore, the deviation of the inclination of the electronic cassette **10** about the Z-axis is reduced by rotating the electronic cassette **10** about the Z-axis for each first retainer **14**.
(63) For example, as illustrated in FIG. **12**, the second notification screen **115** displayed on the touch panel display **55** after the second imaging instruction includes the same illustration display region **91** and guide display region **93** as the first notification screen **90** and result display regions **116**A and **116**B. The analysis result **76_2**A and the displacement amount calculation result **77_2**A are displayed in the result display region **116**A. Specifically, the inclination β of the electronic cassette **10** about the Y-axis and the amount of displacement of the movable portion **39** for reducing the deviation of the inclination of the electronic cassette **10** about the Y-axis are displayed in the result display region **116**A. Further, in a case in which β is 0°, the displacement amount calculation result **77_2**A is not displayed in the result display region **116**A, and a message indicating that the adjustment of the length of the movable portion **39** is not required is displayed.
(64) The analysis result **76_2**B, specifically, the inclination γ of the electronic cassette **10** about the Z-axis is displayed in the result display region **116**B. In addition, the rotation direction and the amount of rotation of the first retainer **14** for reducing the deviation of the inclination of the electronic cassette **10** about the Z-axis which is derived from the analysis result **76_2**B are displayed in the result display region **116**B. Further, in a case in which γ is 0°, the rotation direction and the amount of rotation of the first retainer **14** are not displayed, and a message indicating that the adjustment of the orientation of the first retainer **14** is not necessary is displayed.
(65) An OK button **117** is provided in a lower portion of the second notification screen **115**. The operator OP displaces the movable portion **39** or the first retainer **14** with reference to the graduations on the basis of the display of the result display regions **116**A and **116**B and then selects the OK button **117**. In a case in which the OK button **117** is selected, the third imaging instruction is issued. In addition, after the selection of the OK button **117**, in a case in which the deviation of the inclination of the electronic cassette **10** about the Y-axis and/or the Z-axis has not been sufficiently reduced, the third imaging instruction is not issued, and the operator OP is prompted to adjust the length of the movable portion **39** again. Here, the case in which the deviation of the inclination of the electronic cassette **10** about the Y-axis and/or the Z-axis has not been sufficiently reduced is a case in which the inclination β and/or the inclination γ of the electronic cassette **10** about the Y-axis and/or the Z-axis has not been 0° or a case in which the inclination β and/or the inclination γ has not fallen within a preset allowable range having 0° as its center (for example, $-1°<\beta<+1°$, $-1°<\gamma<+1°$).
(66) For example, as illustrated as an analysis image **80_3** in FIG. **13**, the image analysis unit **70** extracts an image of the markers M**1** to M**4** from a captured image **75_3** captured by the third imaging instruction using a well-known image recognition technique. The image analysis unit **70** calculates an area S of a rectangle surrounded by lines connecting the centers of the markers M**1** to M**4**. In addition, the image recognition technique by which the image analysis unit **70** extracts the image of the markers M**1** to M**4** and the string **34** from the analysis image **80** also includes a technique such as semantic segmentation by a machine learning model using a convolutional neural

network.
(67) The image analysis unit **70** calculates the SID from the area S with reference to an SID calculation table **120**. The SID is registered for each area S in the SID calculation table **120**. The SID calculation table **120** is stored in the storage **56**. The SID in a case in which the area S is small is relatively long. The SID in a case in which the area S is large is relatively short. The image analysis unit **70** outputs the calculated SID as an analysis result **76_3**A to the display control unit **72**. FIG. **13** illustrates a case in which the area S is 300 and 300 cm is calculated as the SID.
(68) In addition, for example, as illustrated in FIG. **14**, the image analysis unit **70** extracts the center of gravity (here, the center of the rectangle) MC surrounded by the lines connecting the centers of the markers M**1** to M**4** in the analysis image **80_3** of the captured image **75_3** captured by the third imaging instruction. The image analysis unit **70** calculates an interval Δ between the extracted center of gravity MC and the line LC, which passes through the center of the captured image **75** and is parallel to the Z-axis, in the Y-axis direction. As described above, the line LC is matched with the line that is parallel to the Z-axis passing through the irradiation center of the radiation R. Therefore, Δ indicates the deviation of the electronic cassette **10** from the irradiation center in the Y-axis direction (hereinafter, simply referred to as deviation from the irradiation center). That is, Δ is nothing less than the position with respect to the irradiation center. The image analysis unit **70** outputs the calculated deviation Δ from the irradiation center as an analysis result **76_3**B to the display control unit **72**. FIG. **14** illustrates a case in which +20 cm is calculated as the deviation Δ from the irradiation center. In addition, for convenience, the process illustrated in FIG. **13** for calculating the SID and the process illustrated in FIG. **14** for calculating the deviation Δ from the irradiation center have been described separately. However, the image analysis unit **70** performs these processes in FIG. **13** and FIG. **14** in parallel.
(69) For example, as illustrated in FIG. **15**, the third notification screen **125** displayed on the touch panel display **55** after the third imaging instruction includes an illustration display region **126** and result display regions **127**A and **127**B. An illustration of the electronic cassette **10**, the radiation source **11**, and the subject H and the SID are displayed in the illustration display region **126**. The words “right” and “left” are displayed in the vicinity of the illustration of the electronic cassette **10**.
(70) The analysis result **76_3**A, specifically, the SID is displayed in the result display region **127**A. In addition, the amounts of movement of the electronic cassette **10** and the radiation source **11** in the X-axis direction for making the SID, which is derived from the analysis result **76_3**A, have a value associated with the imaging menu is displayed in the result display region **127**A. In a case in which the SID has the value associated with the imaging menu, the amounts of movement of the electronic cassette **10** and the radiation source **11** in the X-axis direction are not displayed, and a message indicating that the movement of the electronic cassette **10** and the radiation source **11** in the X-axis direction is not required is displayed.
(71) The analysis result **76_3**B, specifically, the deviation Δ from the irradiation center is displayed in the result display region **127**B. In addition, the movement direction and the amount of movement of the first retainer **14** for reducing the deviation Δ from the irradiation center, which is derived from the analysis result **76_3**B, is displayed in the result display region **127**B. Here, the amount of movement of the first retainer **14** for reducing the deviation Δ from the irradiation center is, for example, the amount of movement for eliminating the deviation Δ. The amount of movement for eliminating the deviation Δ may be the amount of movement for completely eliminating the deviation Δ and may include an error (for example, an error of about 1% to 10%) that is generally allowed in the technical field to which the technology of the present disclosure belongs and is not contrary to the gist of the technology of the present disclosure. Alternatively, the amount of movement of the first retainer **14** for reducing the deviation Δ from the irradiation center may be an amount of movement for making the deviation Δ less than a preset threshold value. In addition, in a case in which there is no deviation Δ from the irradiation center, the movement direction and the amount of movement of the first retainer **14** are not displayed, and a message indicating that the

movement of the first retainer **14** is not required is displayed.

(72) An OK button **128** is provided in a lower portion of the third notification screen **125**. The operator OP moves the electronic cassette **10** and the radiation source **11** along the X-axis or moves the first retainer **14** along the Y-axis on the basis of the display of the result display regions **127**A and **127**B and then selects the OK button **128**. In a case in which the OK button **128** is selected, the display is switched to a screen for inputting the instruction to start the emission of the radiation R to the radiation source control device **12**. In addition, after the selection of the OK button **128**, in a case in which the SID has not been the value associated with the imaging menu and/or in a case in which the deviation Δ from the irradiation center has not been sufficiently reduced, the display is not changed to the screen for inputting the instruction to start the emission of the radiation R to the radiation source control device **12**, and the operator OP is prompted to adjust the positions of the electronic cassette **10** and the radiation source **11** again. Here, the case in which the SID has not been the value associated with the imaging menu is a case in which the SID has not been matched with the value associated with the imaging menu or a case in which the SID has not fallen within a preset allowable range having the value associated with the imaging menu as its center (for example, −5 cm<the value associated with the imaging menu<+5 cm). The case in which the deviation Δ from the irradiation center has not been sufficiently reduced is a case in which the deviation Δ from the irradiation center has not been 0 cm or a case in which the deviation Δ has not fallen within a preset allowable range having 0 cm as its center (for example, −1 cm<Δ<+1 cm).

(73) Next, the operation of the above-mentioned configuration will be described with reference to, for example, flowcharts illustrated in FIGS. **16** and **17**. First, as illustrated in FIG. **16**, the operator OP carries the radiography system **2** (the electronic cassette **10**, the radiation source **11**, the radiation source control device **12**, the console **13**, the first retainer **14**, and the second retainer **16**) into an imaging site (Step ST**100**). The operator OP attaches the electronic cassette **10** to the first retainer **14** and the radiation source **11** to the second retainer **16** (Step ST**110**). Then, the electronic cassette **10** and the radiation source **11** are installed (temporarily placed) on the installation surface **15** at the imaging site through the first retainer **14** and the second retainer **16** (Step ST**120**). In this case, the operator OP disposes the electronic cassette **10** such that the detection surface **17** is along the Z-axis as much as possible. In addition, the operator OP disposes the detection surface **17** of the electronic cassette **10** and the radiation source **11** to face each other such that at least the markers M**3** and M**4** and the string **34** come within the angle of view of the camera **20**.

(74) The operator OP operates the console **13** to select an imaging menu and to set the irradiation conditions of the radiation R (Step ST**130**). Then, the operator OP operates the console **13** to issue the first imaging instruction to the camera **20** (Step ST**140**). The captured image **75_1** is captured by the camera **20** in response to the first imaging instruction.

(75) As illustrated in FIG. **6**, the image analysis unit **70** analyzes the captured image **75_1** to detect the inclination α of the electronic cassette **10** about the X-axis (Step ST**150**). The analysis result **76_1** including the inclination α of the electronic cassette **10** about the X-axis is output from the image analysis unit **70** to the displacement amount calculation unit **71** and the display control unit **72**.

(76) As illustrated in FIG. **7**, the displacement amount calculation unit **71** calculates the amount of displacement of the movable portion **39** for reducing the deviation of the inclination of the electronic cassette **10** about the X-axis with reference to the displacement amount calculation table **85** (Step ST**160**). The displacement amount calculation result **77_1** is output from the displacement amount calculation unit **71** to the display control unit **72**.

(77) As illustrated in FIG. **8**, the first notification screen **90** is displayed on the touch panel display **55** of the console **13** under the control of the display control unit **72** (Step ST**170**). The first notification screen **90** has the result display region **92** in which the inclination α of the electronic cassette **10** about the X-axis and the amount of displacement of the movable portion **39** for reducing the deviation of the inclination of the electronic cassette **10** about the X-axis are

displayed. The operator OP adjusts the length of the movable portion **39** on the basis of the display of the result display region **92** (Step ST**180**). In a case in which the inclination α of the electronic cassette **10** about the X-axis is 0°, Step ST**180** is omitted.
(78) The operator OP selects the OK button **94** on the first notification screen **90** to issue the second imaging instruction to the camera **20** (Step ST**190**). The captured image **75_2** is captured by the camera **20** in response to the second imaging instruction.
(79) As illustrated in FIGS. **9** and **10**, the image analysis unit **70** analyzes the captured image **75_2** to detect the inclinations β and γ of the electronic cassette **10** about the Y-axis and the Z-axis (Step ST**200**). The analysis result **76_2**A including the inclination β of the electronic cassette **10** about the Y-axis is output from the image analysis unit **70** to the displacement amount calculation unit **71** and the display control unit **72**. Further, the analysis result **76_2**B including the inclination γ of the electronic cassette **10** about the Z-axis is output from the image analysis unit **70** to the display control unit **72**.
(80) As illustrated in FIG. **11**, the displacement amount calculation unit **71** calculates the amount of displacement of the movable portion **39** for reducing the deviation of the inclination of the electronic cassette **10** about the Y-axis with reference to the displacement amount calculation table **110** (Step ST**210**). The displacement amount calculation result **77_2**A is output from the displacement amount calculation unit **71** to the display control unit **72**.
(81) As illustrated in FIG. **12**, the second notification screen **115** is displayed on the touch panel display **55** of the console **13** under the control of the display control unit **72** (Step ST**220**). The second notification screen **115** has the result display region **116**A in which the inclination β of the electronic cassette **10** about the Y-axis and the amount of displacement of the movable portion **39** for reducing the deviation of the inclination of the electronic cassette **10** about the Y-axis are displayed. In addition, the second notification screen **115** has the result display region **116**B in which the inclination γ of the electronic cassette **10** about the Z-axis and the rotation direction and the amount of rotation of the first retainer **14** for reducing the deviation of the inclination of the electronic cassette **10** about the Z-axis are displayed. The operator OP adjusts, for example, the length of the movable portion **39** on the basis of the display of the result display regions **116**A and **116**B (Step ST**230**). In a case in which the inclination β of the electronic cassette **10** about the Y-axis is 0° and the inclination γ of the electronic cassette **10** about the Z-axis is 0°, Step ST**230** is omitted.
(82) As illustrated in FIG. **17**, the operator OP selects the OK button **117** on the second notification screen **115** to issue the third imaging instruction to the camera **20** (Step ST**240**). The captured image **75_3** is captured by the camera **20** in response to the third imaging instruction.
(83) As illustrated in FIG. **13**, the image analysis unit **70** analyzes the captured image **75_3** to calculate the area S of the rectangle surrounded by the lines connecting the centers of the markers M**1** to M**4**. Then, the SID is calculated from the area S with reference to the SID calculation table **120** (Step ST**250**). In addition, as illustrated in FIG. **14**, the deviation Δ from the irradiation center is calculated (Step ST**250**). The analysis result **76_3**A including the SID and the analysis result **76_3**B including the deviation Δ from the irradiation center are output from the image analysis unit **70** to the display control unit **72**.
(84) As illustrated in FIG. **15**, the third notification screen **125** is displayed on the touch panel display **55** of the console **13** under the control of the display control unit **72** (Step ST**260**). The third notification screen **125** has the result display region **127**A in which the SID and the amounts of movement of the electronic cassette **10** and the radiation source **11** in the X-axis direction for making the SID have the value associated with the imaging menu are displayed. In addition, the third notification screen **125** has the result display region **127**B in which the deviation Δ from the irradiation center and the movement direction and the amount of movement of the first retainer **14** for reducing the deviation Δ from the irradiation center are displayed. The operator OP adjusts the positions of the electronic cassette **10** and the radiation source **11** (the positions of the first retainer

14 and the second retainer **16**) on the basis of the display of the result display regions **127**A and **127**B (Step ST**270**). In a case in which the SID is the value associated with the imaging menu and there is no deviation Δ from the irradiation center, Step ST**270** is omitted.

(85) The operator OP selects the OK button **128** on the third notification screen **125**. Then, the operator OP makes the subject H stand in front of the electronic cassette **10** and adjusts the position and posture of the subject H such that a craniocaudal axis is parallel to the Z-axis or the arms are crossed sideways (Step ST**280**). Then, the operator OP operates the handle **36** of the first retainer **14** to adjust the height position of the electronic cassette **10** in accordance with the body type of the subject H. Then, the operator OP operates the handle of the second retainer **16** to match the height position of the radiation source **11** with the height position of the electronic cassette **10** (Step ST**290**). Then, the operator OP operates the console **13** to input the instruction to start the emission of the radiation R to the radiation source control device **12**. Then, the radiation R is emitted from the radiation source **11** to the subject H, the electronic cassette **10** detects the radiation R transmitted through the subject H, and a radiographic image is output from the electronic cassette **10** (Step ST**300**). The radiographic image is transmitted from the electronic cassette **10** to the console **13**. Then, the radiographic image is displayed on the touch panel display **55** under the control of the display control unit **72** to be viewed by the operator OP.

(86) As described above, the radiography system **2** comprises the radiation source **11** that emits the radiation R, the electronic cassette **10** that receives the radiation R and detects a radiographic image, the portable first retainer **14** that holds the electronic cassette **10**, the string **34** that is attached to the first retainer **14**, and the camera **20** that images the string **34**. The first retainer **14** includes the lock portion **38** and the movable portion **39** as an inclination change mechanism that can change the inclination of the electronic cassette **10** with respect to the radiation source **11**. The string **34** and the camera **20** constitute a first detection mechanism that detects the inclination α of the electronic cassette **10** about the X-axis which intersects the Z-axis and is directed toward the radiation source **11** in a case in which the detection surface **17** for the radiation R in the electronic cassette **10** and the radiation source **11** are disposed to face each other. Since the inclination α of the electronic cassette **10** about the X-axis can be detected by the string **34** and the camera **20**, it is possible to reduce the concern that, in a state in which the electronic cassette **10** is inclined about the X-axis, radiography will be performed on the subject in a posture in which the craniocaudal axis is parallel to the Z-axis and a radiography image in which the subject H is obliquely captured will be detected, resulting in a failure in radiography.

(87) The display control unit **72** performs control to display the inclination α of the electronic cassette **10** about the X-axis on the touch panel display **55**. Therefore, it is possible to inform the operator OP of the inclination α of the electronic cassette **10** about the X-axis and to prompt the operator OP to consider a technique for reducing the deviation of the inclination of the electronic cassette **10** about the X-axis.

(88) The displacement amount calculation unit **71** calculates the amount of displacement of the movable portion **39** for reducing the deviation of the inclination of the electronic cassette **10** about the X-axis on the basis of the inclination α of the electronic cassette **10** about the X-axis. The display control unit **72** performs control to display the calculated amount of displacement of the movable portion **39** for reducing the deviation of the inclination of the electronic cassette **10** about the X-axis on the touch panel display **55**. Therefore, it is possible to inform the operator OP of the amount of displacement of the movable portion **39** for reducing the deviation of the inclination of the electronic cassette **10** about the X-axis. Since the operator OP only needs to adjust the length of the movable portion **39** on the basis of the displayed amount of displacement, it is possible to easily reduce the deviation of the inclination of the electronic cassette **10** about the X-axis.

(89) The first detection mechanism includes the string **34** that hangs down in the direction parallel to the Z-axis and the camera **20** that images the string **34**. The image analysis unit **70** analyzes the captured image **75_1** including the string **34** captured by the camera **20** to detect the inclination α

of the electronic cassette **10** about the X-axis. The string **34** may be any object as long as it hangs down in the direction parallel to the Z-axis without loosening, and the camera **20** may have sufficient resolution to extract the image of the string **34** using image recognition. Therefore, the inclination α of the electronic cassette **10** about the X-axis can be detected by a relatively inexpensive and simple configuration.
(90) The camera **20** is provided in the radiation source **11**. Therefore, it is possible to easily associate the angle of view of the camera **20** with the irradiation field of the radiation R. For example, the line LC that passes through the center of the captured image **75** and is parallel to the Z-axis can be matched with the line that passes through the irradiation center of the radiation R and is parallel to the Z-axis. In addition, in the technology of the present disclosure, “the camera is provided in the radiation source” is a concept including both a case in which the radiation source **11** and the camera **20** are separately provided and the camera **20** is “attached to the radiation source **11**” as in the present embodiment and a case in which the camera **20** is “integrally incorporated” in the radiation source **11**.
(91) The markers M**1** to M**4** and the camera **20** are provided as a second detection mechanism for detecting the inclinations β and γ of the electronic cassette **10** about the Y-axis and the Z-axis. It is possible to detect not only the inclination α of the electronic cassette **10** about the X-axis but also the inclinations β and γ of the electronic cassette **10** about the Y-axis and the Z-axis. Therefore, it is possible to reduce the concern that radiography will be performed in a state in which the electronic cassette **10** is inclined about the Y-axis and/or the Z-axis and a radiography image in which the irradiation states of the radiation R are different in the vertical direction and the horizontal direction will be detected, resulting in a failure in radiography.
(92) The display control unit **72** performs control to display the inclinations β and γ of the electronic cassette **10** about the Y-axis and the Z-axis on the touch panel display **55**. Therefore, it is possible to inform the operator OP of the inclinations β and γ of the electronic cassette **10** about the Y-axis and the Z-axis and to prompt the operator OP to consider a technique for reducing the deviation of the inclinations of the electronic cassette **10** about the Y-axis and the Z-axis.
(93) The displacement amount calculation unit **71** calculates the amount of displacement of the movable portion **39** for reducing the deviation of the inclination of the electronic cassette **10** about the Y-axis on the basis of the inclination β of the electronic cassette **10** about the Y-axis. The display control unit **72** performs control to display the calculated amount of displacement of the movable portion **39** for reducing the deviation of the inclination of the electronic cassette **10** about the Y-axis on the touch panel display **55**. Therefore, it is possible to inform the operator OP of the amount of displacement of the movable portion **39** for reducing the deviation of the inclination of the electronic cassette **10** about the Y-axis. Since the operator OP only needs to adjust the length of the movable portion **39** on the basis of the displayed amount of displacement, it is possible to easily reduce the deviation of the inclination of the electronic cassette **10** about the Y-axis.
(94) In addition, as the inclination change mechanism that can change the inclination of the electronic cassette **10** about the Z-axis, a rotation mechanism that rotates the electronic cassette **10** about the Z-axis while maintaining the positional relationship between the leg portions **33**A to **33**C may be provided in the first retainer **14**. In this case, the displacement amount calculation unit **71** also calculates the amount of rotation of the rotation mechanism for reducing the deviation of the inclination of the electronic cassette **10** about the Z-axis on the basis of the inclination γ of the electronic cassette **10** about the Z-axis, in addition to the amount of displacement of the movable portion **39** for reducing the deviation of the inclination of the electronic cassette **10** about the Y-axis. In addition, the display control unit **72** also displays the amount of rotation of the rotation mechanism for reducing the deviation of the inclination of the electronic cassette **10** about the Z-axis on the touch panel display **55**, as in a result display region **116**B of the second notification screen **115** illustrated in FIG. **18** as an example.
(95) The second detection mechanism includes the four markers M**1** to M**4** provided in the first

retainer **14** and the camera **20** that images the markers M**1** to M**4**. The image analysis unit **70** analyzes the captured image **75_2** of the camera **20** to detect the inclinations β and γ of the electronic cassette **10** about the Y-axis and the Z-axis. Therefore, it is possible to detect the inclinations β and γ of the electronic cassette **10** about the Y-axis and the Z-axis with a relatively inexpensive and simple configuration.

(96) The image analysis unit **70** analyzes the captured image **75_3** from the camera **20** and detects the SID which is the distance from the generation point of the radiation R to the detection surface **17** of the electronic cassette **10** and the deviation Δ from the irradiation center which is the position of the electronic cassette **10** with respect to the irradiation center of the radiation R in the YZ plane configured by the Y-axis and the Z-axis. Therefore, the SID can be set to the value associated with the imaging menu, and the deviation Δ from the irradiation center can be reduced. In addition, it is possible to reduce the concern that radiography will fail.

(97) The first retainer **14** includes the holder **30** to which the electronic cassette **10** is attached and three leg portions **33**A to **33**C that support the holder **30**. As described above, since the first retainer **14** has a very simple configuration, it can be easily carried into an imaging site and can be easily installed on the installation surface **15** at the imaging site. In addition, the first retainer **14** is not limited to the illustrated tripod, but may be, for example, a tetrapod or a pentapod. That is, the number of leg portions **33** may be four or more.

(98) The markers M**1** to M**4** are provided in the holder **30**. Therefore, it is possible to prevent the markers M**1** to M**4** from being included in the radiographic image. Further, in a case in which the markers M**1** to M**4** are provided at the position of the holder **30** where the markers M**1** to M**4** are not hidden by the subject H standing in front of the electronic cassette **10**, it is possible to adjust the position and posture of the electronic cassette **10** with respect to the radiation source **11** after the subject H is placed in front of the electronic cassette **10**. In addition, as in the case in which "the camera is provided in the radiation source", in the technology of the present disclosure, "the markers are provided in the holder" is a concept including both a case in which the holder **30** and the markers M**1** to M**4** are provided separately and the markers M**1** to M**4** are attached to the holder **30** as in this embodiment and a case in which the markers M**1** to M**4** are "integrally incorporated" into the holder **30**.

(99) Further, for example, as illustrated in FIG. **19**, the markers M**1** to M**4** may be provided in the electronic cassette **10**. However, in this case, it is preferable to provide the markers M**1** to M**4** while avoiding the detection surface **17** of the radiation R in order to prevent the markers M**1** to M**4** from being included in the radiographic image.

(100) The first retainer **14** includes the fixing mechanism **45** that fixes the positional relationship between the holder **30** and the leg portions **33**A to **33**C. Therefore, the positional relationship between the holder **30** and the leg portions **33**A to **33**C can always be fixed to the state illustrated in FIG. **3**. In a case in which the subject H stands in front of the electronic cassette **10**, the leg portions **33**A to **33**C do not get in the way. Further, the displacement amount calculation tables **85** and **110** can be created on the premise that the positional relationship between the holder **30** and the leg portions **33**A to **33**C is fixed, and the amount of displacement of the movable portion **39** can be easily calculated with reference to the displacement amount calculation tables **85** and **110**.

Second Embodiment

(101) In the first embodiment, the string **34** and the camera **20** have been described as an example of the first detection mechanism, but the present disclosure is not limited thereto. In a second embodiment, an acceleration sensor **130** is used as the first detection mechanism.

(102) For example, as illustrated in FIG. **20**, the acceleration sensor **130** is provided in a central portion of the holder **30** of the first retainer **14** according to the second embodiment. The acceleration sensor **130** is preset to output gravitational acceleration g as a measurement result **136** (see FIG. **21**) in a case in which the inclination α of the electronic cassette **10** about the X-axis is=0°.

(103) For example, as illustrated in FIG. **21**, in addition to the units **70** to **72** according to the first embodiment, an inclination calculation unit **135** is constructed in the CPU **58** of the console **13** according to the second embodiment. The measurement result **136** from the acceleration sensor **130** is input to the inclination calculation unit **135**. In a case in which the measurement result **136** is AC, the inclination calculation unit **135** calculates the inclination α of the electronic cassette **10** about the X-axis using the following Expression (1):

$\alpha=\cos^{-1}(AC/g)$ (1).

(104) The inclination calculation unit **135** outputs an analysis result **76_1** including the calculated inclination α of the electronic cassette **10** about the X-axis to the displacement amount calculation unit **71** and the display control unit **72**.

(105) As described above, in the second embodiment, the first detection mechanism includes the acceleration sensor **130**. The inclination calculation unit **135** detects the inclination α of the electronic cassette **10** about the X-axis on the basis of the measurement result **136** of the acceleration sensor **130**. The inclination α of the electronic cassette **10** about the X-axis can be detected by a configuration including only the acceleration sensor **130** which is cheaper and simpler than the string **34** and the camera **20**. In addition, the acceleration sensor **130** may be provided in the electronic cassette **10** instead of the holder **30**.

(106) The center pole **31** may be moved up and down using an actuator such as a motor. In this case, the center pole **31** may be remotely operated by a remote controller to be moved up and down. Not only the center pole **31** of the first retainer **14** but also the center pole of the second retainer **16** may be moved up and down using an actuator, such as a motor, and may be remotely operated by a remote controller to be moved up and down. In addition, the first retainer **14** and the second retainer **16** may be connected such that they can communicate with each other, and the center pole of the second retainer **16** may be moved up and down in operative association with the vertical movement of the center pole **31** of the first retainer **14**.

(107) The movable portion **39** may be expanded and contracted using an actuator, such as a motor. In addition, the movable portion **39** may be automatically expanded and contracted according to the amount of displacement calculated by the displacement amount calculation unit **71** without the help of the operator OP. In this case, it is not necessary to display the inclination of the electronic cassette **10** and the amount of displacement of the movable portion **39** for reducing the deviation of the inclination of the electronic cassette **10** on the touch panel display **55**.

(108) For example, the calculation of the inclinations β and γ of the electronic cassette **10** about the Y-axis and the Z-axis may be performed first, and the calculation of the inclination α of the electronic cassette **10** about the X-axis may be performed later.

(109) The fixing mechanism for fixing the positional relationship between the holder **30** and the leg portions **33** is not limited to the fixing mechanism **45** (click stop mechanism) given as an example in the first embodiment. A fixing mechanism which fixes the holder **30** and the leg portions **33** not to be rotatable in the positional relationship illustrated in FIG. **3** may be used. In addition, the leg portions **33** may be configured to be freely rotatable with respect to the main body portion **32**, and markers may be attached to portions of the main body portion **32** having the positional relationship illustrated in FIG. **3**.

(110) At least three markers may constitute the second detection mechanism. Therefore, the number of markers may be five or more. In a case in which the position and posture of the electronic cassette **10** with respect to the radiation source **11** are adjusted after the subject H stands in front of the electronic cassette **10**, for example, the inclination α of the electronic cassette **10** about the X-axis may be detected using at least three markers that are not hidden by the subject H among a plurality of markers.

(111) The string **34** may be suspended from the electronic cassette **10**. Assuming that the string **34** sways due to wind or the like, a mechanism for suppressing the sway of the string **34** may be provided. In addition, the markers constituting the second detection mechanism may be printed on

the electronic cassette **10** or the holder **30**.

(112) The electronic cassette is given as an example of the radiographic image detector. However, the present disclosure is not limited thereto. A film cassette or an imaging plate (IP) cassette may be used.

(113) In each of the above-described embodiments, the aspect in which various screens, such as the first notification screen **90**, the second notification screen **115**, and the third notification screen **125**, are displayed on the touch panel display **55** of the console **13**, which is a display, under the control of the display control unit **72** of the CPU **58** of the console **13** has been described as an example. However, the present disclosure is not limited thereto. Screen data of various screens, such as the first notification screen **90**, the second notification screen **115**, and the third notification screen **125**, may be generated by the console **13**. Then, the generated screen data may be transmitted from the console **13** to another external device having a display, for example, a smart phone owned by the operator OP. In this case, a touch panel display of the smart phone is an example of a "display" according to the technology of the present disclosure.

(114) In each of the above-described embodiments, for example, the following various processors can be used as the hardware structure of processing units performing various processes, such as the image analysis unit **70**, the displacement amount calculation unit **71**, the display control unit **72**, and the inclination calculation unit **135**. The various processors include, for example, the CPU **58** which is a general-purpose processor executing software (operation program **60**) to function as various processing units as described above, a programmable logic device (PLD), such as a field programmable gate array (FPGA), which is a processor whose circuit configuration can be changed after manufacture, and a dedicated electric circuit, such as an application specific integrated circuit (ASIC), which is a processor having a dedicated circuit configuration designed to perform a specific process.

(115) One processing unit may be configured by one of the various processors or a combination of two or more processors of the same type or different types (for example, a combination of a plurality of ASICs and/or a combination of an ASIC and an FPGA). In addition, a plurality of processing units may be configured by one processor.

(116) A first example of the configuration in which a plurality of processing units are configured by one processor is an aspect in which one processor is configured by a combination of one or more CPUs and software and functions as a plurality of processing units. A representative example of this aspect is a client computer or a server computer. A second example of the configuration is an aspect in which a processor that implements the functions of the entire system including a plurality of processing units using one integrated circuit (IC) chip is used. A representative example of this aspect is a system-on-chip (SoC). As described above, various processing units are configured by using one or more of the various processors as a hardware structure.

(117) Furthermore, specifically, an electric circuit (circuitry) obtained by combining circuit elements, such as semiconductor elements, can be used as the hardware structure of the various processors.

(118) In the technology of the present disclosure, the above-described various embodiments and/or various modification examples may be combined with each other. In addition, the present disclosure is not limited to each of the above-described embodiments, and various configurations can be used without departing from the gist of the present disclosure. Furthermore, the technology of the present disclosure extends to a storage medium that non-temporarily stores a program, in addition to the program.

(119) The above descriptions and illustrations are detailed descriptions of portions related to the technology of the present disclosure and are merely examples of the technology of the present disclosure. For example, the above description of the configurations, functions, operations, and effects is the description of examples of the configurations, functions, operations, and effects of portions according to the technology of the present disclosure. Therefore, unnecessary portions

may be deleted or new elements may be added or replaced in the above descriptions and illustrations without departing from the gist of the technology of the present disclosure. In addition, in the content described and illustrated above, the description of, for example, common technical knowledge that does not need to be particularly described to enable the implementation of the technology of the present disclosure is omitted in order to avoid confusion and facilitate the understanding of portions related to the technology of the present disclosure.
(120) In the specification, “A and/or B” is synonymous with “at least one of A or B”. That is, “A and/or B” means only A, only B, or a combination of A and B. Further, in the specification, the same concept as “A and/or B” is applied to a case in which the connection of three or more matters is expressed by “and/or”.
(121) All of the documents, the patent applications, and the technical standards described in the specification are incorporated by reference herein to the same extent as each individual document, each patent application, and each technical standard are specifically and individually stated to be incorporated by reference.

Claims

1. A radiography system comprising: a radiation source that emits radiation; a radiographic image detector that receives the radiation and detects a radiographic image; a portable retainer that holds the radiographic image detector and includes an inclination change mechanism which is configured to change an inclination of the radiographic image detector with respect to the radiation source; and a first detection mechanism that detects an inclination of the radiographic image detector about a first axis which intersects a vertical axis and which is directed toward the radiation source in a case in which a detection surface for the radiation in the radiographic image detector and the radiation source are disposed to face each other, wherein the radiography system further comprises a first processor, wherein the first detection mechanism comprises a string that hangs down in a direction parallel to the vertical axis and a first camera that images the string, wherein the first processor analyzes an image including the string captured by the first camera to detect the inclination of the radiographic image detector about the first axis, and wherein the inclination change mechanism comprises a telescopic movable portion and a lock portion configured to secure the movable portion.
2. The radiography system according to claim 1, wherein the first processor performs control to display the inclination of the radiographic image detector about the first axis on a display.
3. The radiography system according to claim 2, wherein the first processor calculates an amount of displacement of the inclination change mechanism for reducing deviation of the inclination of the radiographic image detector about the first axis on the basis of the inclination of the radiographic image detector about the first axis and performs control to display the calculated amount of displacement on the display.
4. The radiography system according to claim 2, wherein the first detection mechanism includes an acceleration sensor, and the first processor detects the inclination of the radiographic image detector about the first axis on the basis of a measurement result of the acceleration sensor.
5. The radiography system according to claim 1, wherein the first camera is provided in the radiation source.
6. The radiography system according to claim 1, further comprising: a second detection mechanism that detects an inclination of the radiographic image detector about at least one of the vertical axis or a second axis which intersects the vertical axis and the first axis, wherein the second detection mechanism includes at least three markers that are provided in the radiographic image detector or the retainer, and a second camera that images the markers.
7. The radiography system according to claim 6, further comprising: a second processor, wherein the second processor performs control to display the inclination of the radiographic image detector

about the at least one of the vertical axis or the second axis on a display.

8. The radiography system according to claim 7, wherein the second processor calculates an amount of displacement of the inclination change mechanism for reducing deviation of the inclination of the radiographic image detector about the at least one of the vertical axis or the second axis on the basis of the inclination of the radiographic image detector about the at least one of the vertical axis or the second axis and performs control to display the calculated amount of displacement on the display.

9. The radiography system according to claim 7, wherein the second processor analyzes an image captured by the second camera to detect the inclination of the radiographic image detector about the at least one of the vertical axis or the second axis.

10. The radiography system according to claim 9, wherein the second processor analyzes the image captured by the second camera to further detect a distance from a generation point of the radiation to the detection surface of the radiographic image detector and a position of the radiographic image detector with respect to an irradiation center of the radiation in a plane configured by the vertical axis and the second axis.

11. The radiography system according to claim 9, wherein the second camera is provided in the radiation source.

12. The radiography system according to claim 9, wherein the retainer includes a holder to which the radiographic image detector is attached and at least three leg portions that support the holder, and the markers are provided in the holder.

13. The radiography system according to claim 1, wherein the retainer includes a holder to which the radiographic image detector is attached and at least three leg portions that support the holder.

14. The radiography system according to claim 13, wherein the retainer includes a fixing mechanism that fixes a positional relationship between the holder and the leg portions, and wherein the fixing mechanism includes a holding portion configured to hold a pole that is connected to the holder, such that the pole is movable up and down, includes a click ball that can project from and retract into the holding portion, and includes a rotating portion that is rotated about the holding portion.