Oct. 16, 1956 W. J. DALY 2,767,322

INDUSTRIAL X-RAY EXPOSURE CHAMBERS

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Fig. 1.

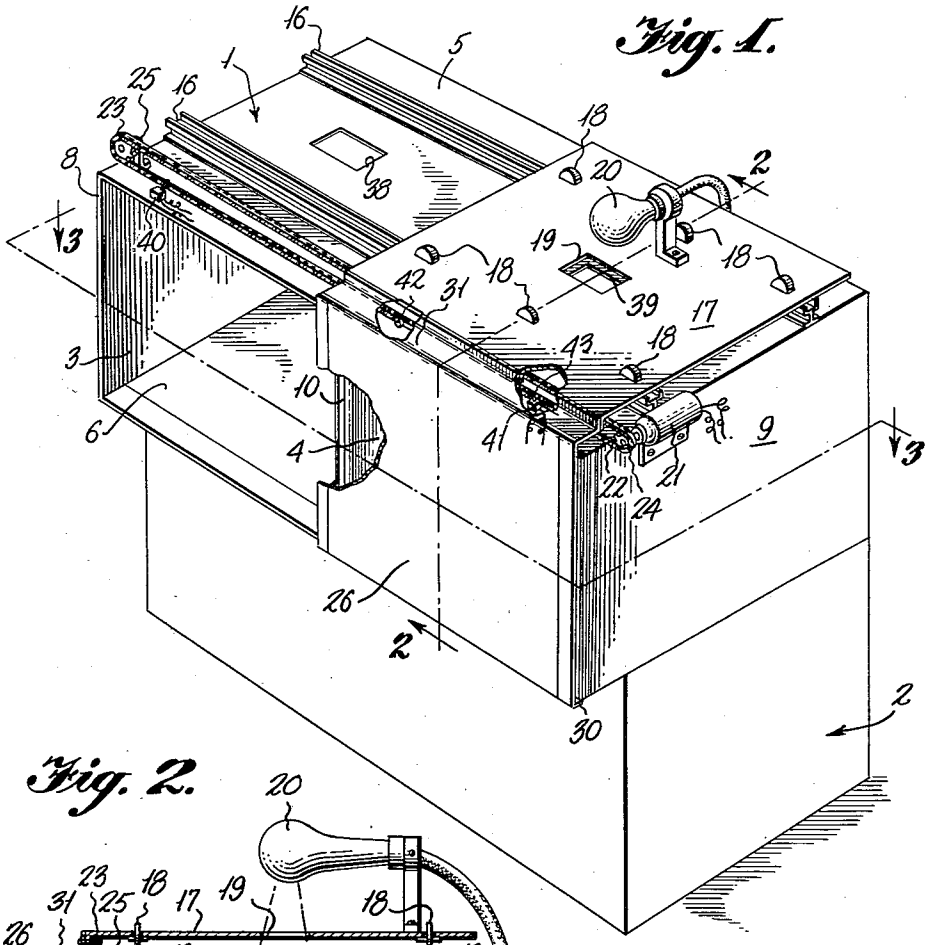
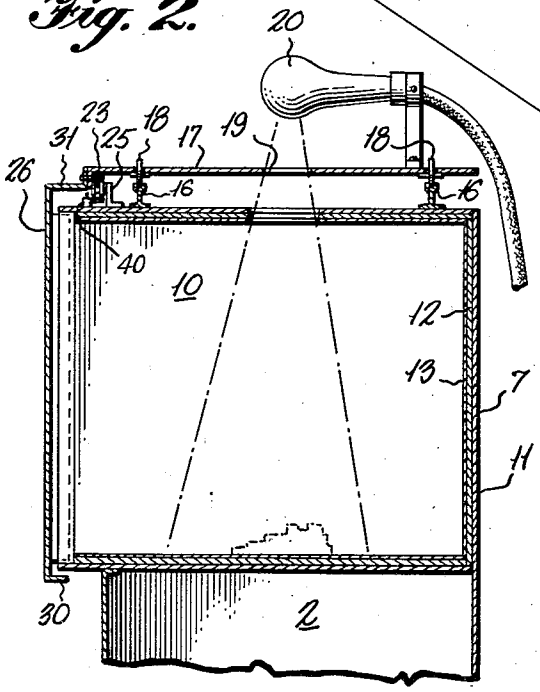


Fig. 2.



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Fig. 3.

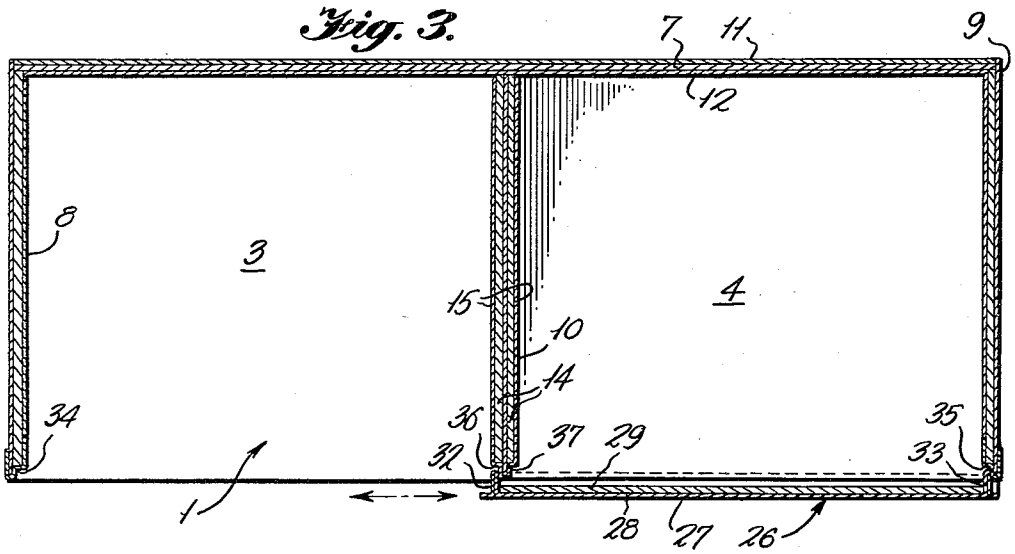
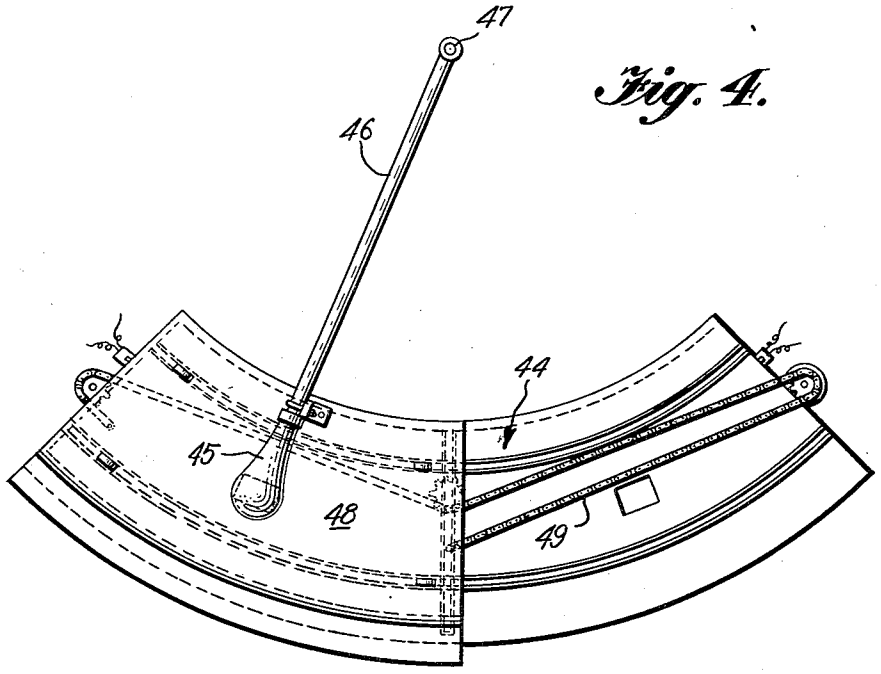


Fig. 4.



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INDUSTRIAL X-RAY EXPOSURE CHAMBERS

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Application February 15, 1954, Serial No. 410,196

4 Claims. (Cl. 250—52)

This invention relates to X-ray chambers particularly adapted for industrial use for the inspection of castings or other things whose internal structure must be known.

Industrial use of X-ray for inspection of castings, etc. has become quite prevalent. Devices commonly used have a single chamber with an X-ray tube fixed above it. The article to be inspected is moved into the chamber either manually or upon a carriage. A door is closed, and the exposure made. The door is opened, the article removed from the chamber, and another is put in. Frequently, in moving the article into the chamber it will be overturned and its identification lost, which means that another exposure must be made. The devices now in use are unsatisfactory because of the difficulty in getting the articles into and out of the chambers, and in the amount of time required to make inspections.

The object of the present invention is to provide an X-ray chamber having a plurality of exposure compartments with an X-ray tube movable for registry with the respective compartments in sequence.

Another object is the provision of such a device having a compartment closure door which is movable with the X-ray tube to automatically close the compartment with which the tube is in registry.

Still another object is to provide means in such a device to assure proper registry of the tube with the compartment and complete closure of the door for each exposure.

It is another object to provide an arrangement whereby a single X-ray tube may be used with a plurality of chambers each having a plurality of compartments, with means to position the tube with any desired chamber.

Other objects of the invention will become apparent from the following description of one practical embodiment thereof when taken in conjunction with the drawings which accompany, and form part of, this specification.

In the drawings:

Figure 1 is a perspective view of an X-ray chamber embodying the principles of the present invention;

Figure 2 is a vertical transverse section through one of the compartments of the chamber, and is taken on the line 2—2 of Figure 1;

Figure 3 is a horizontal section through the device taken on the line 3—3 of Figure 1; and,

Figure 4 is a plan view of a modified form of the invention.

In general, the invention consists of a lead lined chamber divided into two or more compartments, with an X-ray tube carriage movable from compartment to compartment, and a compartment closure door movable with the tube carriage.

Referring to the drawings in detail, the chamber 1 may be mounted upon any suitable base 2. The chamber is divided into a plurality of exposure compartments, two compartments 3 and 4 being shown. The chamber is rectangular having a top 5, bottom 6, back wall 7 and end walls 8 and 9. The front is open. A vertical central partition 10 divides the chamber in two compartments.

The top, bottom, back and end walls are similarly constructed, each being formed of an outside steel sheet 11, an intermediate plywood layer 12, and an inside lead lining 13. The central partition has a plywood layer 14 sandwiched between lead sheets 15.

Extending longitudinally of the top there is a pair of rails 16, spaced apart transversely on opposite sides of the center of the top. The rails are fixed to the top, and a carriage 17 is mounted on them for movement from one end of the chamber to the other. Carriage 17 is substantially one half the length of the chamber, or approximately the length of one of the exposure compartments. The carriage carries a plurality of rollers 18 to ride upon the rails and support the carriage. The carriage is centrally apertured, as at 19, and an X-ray tube 20 is mounted on the carriage to project its rays through the aperture.

Carriage 17 is caused to move across the top of the chamber by means of a reversible motor 21 and a chain 22. Chain 22 is connected to the carriage and passes over sprockets 23 and 24, sprocket 23 being mounted upon a suitable bracket 25 fixed to the top of the chamber and sprocket 24 being mounted on the motor shaft. Operation of the motor will rotate the chain and move the carriage.

Rigidly fixed to the carriage, or formed as an integral part thereof, is an exposure compartment closure door 26. Door 26 moves with the carriage and closes first one exposure compartment and then the other. The X-ray tube will always be above the closed compartment. The door also has a steel outside casing 27, plywood layer 28, and lead liner 29. The door hangs closely adjacent the front of the chamber, and is provided with a rearwardly extending bottom flange 30 to overlap the bottom wall of the chamber. A top flange 31 connects the door to the carriage and overlaps the top edge of the chamber. Seals are also provided at the sides so that no radiation can escape the exposure chamber in use to harm the operator. To seal the sides, the door is provided with inwardly projecting side flanges 32 and 33. These side flanges cooperate with vertical recesses in the end and partition walls to create the seal. The end walls have the recesses 34 and 35 extending along their inner front edges, and the center partition has the recesses 36 and 37 on either side at the front. When the door is in front of the exposure compartment 3, the side flange 32 will fit into, and seal against, the recess 34, and the side flange 33 will seal against the wall of the recess 37 of the central partition. When the door moves to the right to cover the exposure chamber 4, the flange 33 will move into the recess 35 and flange 32 will move into recess 36 of the central partition.

As the carriage and door move, the X-ray tube is moved over first one exposure chamber and then the other. The exposure chambers are provided with apertures 38 and 39 in the centers of their tops. It is important that the aperture 19 in the carriage be in proper registry with either the aperture 38 or 39 for proper exposures. To ensure proper registry, limit switches 40 and 41 are mounted upon the top of the chamber adjacent the chain 22. The switches may be connected in the operating circuit in any conventional manner. The chain will carry buttons 42 and 43 to contact the switches to break the motor circuit when the carriage reaches the proper position.

It will be evident that one of the exposure compartments may be conveniently loaded from the front while an exposure is being made in the other. When the motor circuit is closed, the carriage carrying the X-ray tube and the door will move to the opposite end of the chamber to close the exposure compartment just loaded and place the X-ray tube above the aperture in that compartment so that an exposure may be made. At the same time the first compartment may be unloaded and reloaded. Re-

starting the motor after the exposure will move the carriage and door to the first exposure chamber.

The structure shown in Figure 4 is only slightly different from that just described. The major difference is chamber **44** is curved from end to end, the curve being an arc of a circle. One or more of these chambers is positioned about the center of the arc, and an X-ray tube **45** is mounted on a boom **46** pivoted to swing about a pedestal **47** positioned at the center of the arc. In this form, the X-ray tube is not permanently fixed to the carriage **48**, but may be attached by any convenient means when desired. After the tube is attached to the carriage, the operation is as previously described. Due to the fact that the carriage moves on an arc, the chain **49** is positioned in a horizontal plane rather than vertical.

While in the above practical embodiments of the invention have been disclosed, it will be understood that the details of structure shown and described are merely for purposes of illustration and may be changed within the scope of the appended claims.

What is claimed is:

1. An X-ray chamber comprising, a row of joined lead-lined exposure compartments, each compartment having an aperture in its top and an open front, rails mounted upon the top of the chamber extending along the row of compartments, a carriage mounted for movement on said rails, an aperture in said carriage, an X-ray tube mounted upon said carriage directly above said aperture in the carriage, means to move the carriage from compartment to compartment to sequentially position the aperture in said carriage in vertical alignment with the apertures in the respective compartments, and a door mounted on said carriage and movable therewith to close the front of the compartment over which said carriage is positioned.

2. In an X-ray chamber as claimed in claim 1, cooperating means on said door and the front edges of said compartments to seal said compartments.

3. In an X-ray chamber as claimed in claim 1, cooperating means on said door and the front edges of said compartment to seal said compartments, and means responsive to movement of said carriage to stop carriage movement when the aperture in said carriage is in vertical alignment with the aperture in one of said compartments.

4. An X-ray chamber comprising, a row of joined lead lined exposure compartments, each compartment having an aperture in its top and an open front, rails mounted upon the top of the chamber extending along the row of compartments, a carriage mounted for movement on said rails, an aperture in said carriage, means to move the carriage from compartment to compartment to sequentially position the aperture in said carriage in vertical alignment with the apertures in the respective compartments, a door mounted on said carriage and movable therewith to close the front of the compartment over which said carriage is positioned, said chamber and rails being arcuate in a horizontal plane, a pedestal positioned at the center from which the arcs of the chamber and rails are struck, a horizontal boom pivoted on said pedestal, and an X-ray tube carried by said boom and connected to said carriage.

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