Oct. 3, 1939. D. A. EDDY 2,174,738

X-RAY CASSETTE TUNNEL

Original Filed Aug. 8, 1938 2 Sheets-Sheet 1

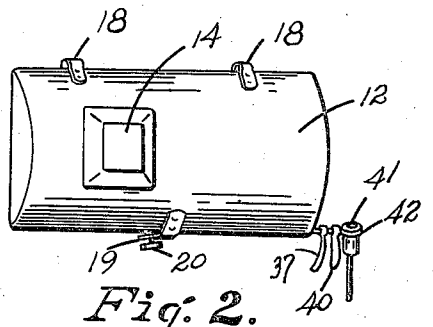



Fig. 2.

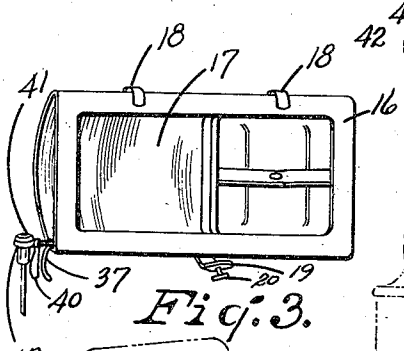



Fig. 3.




Fig. 1.

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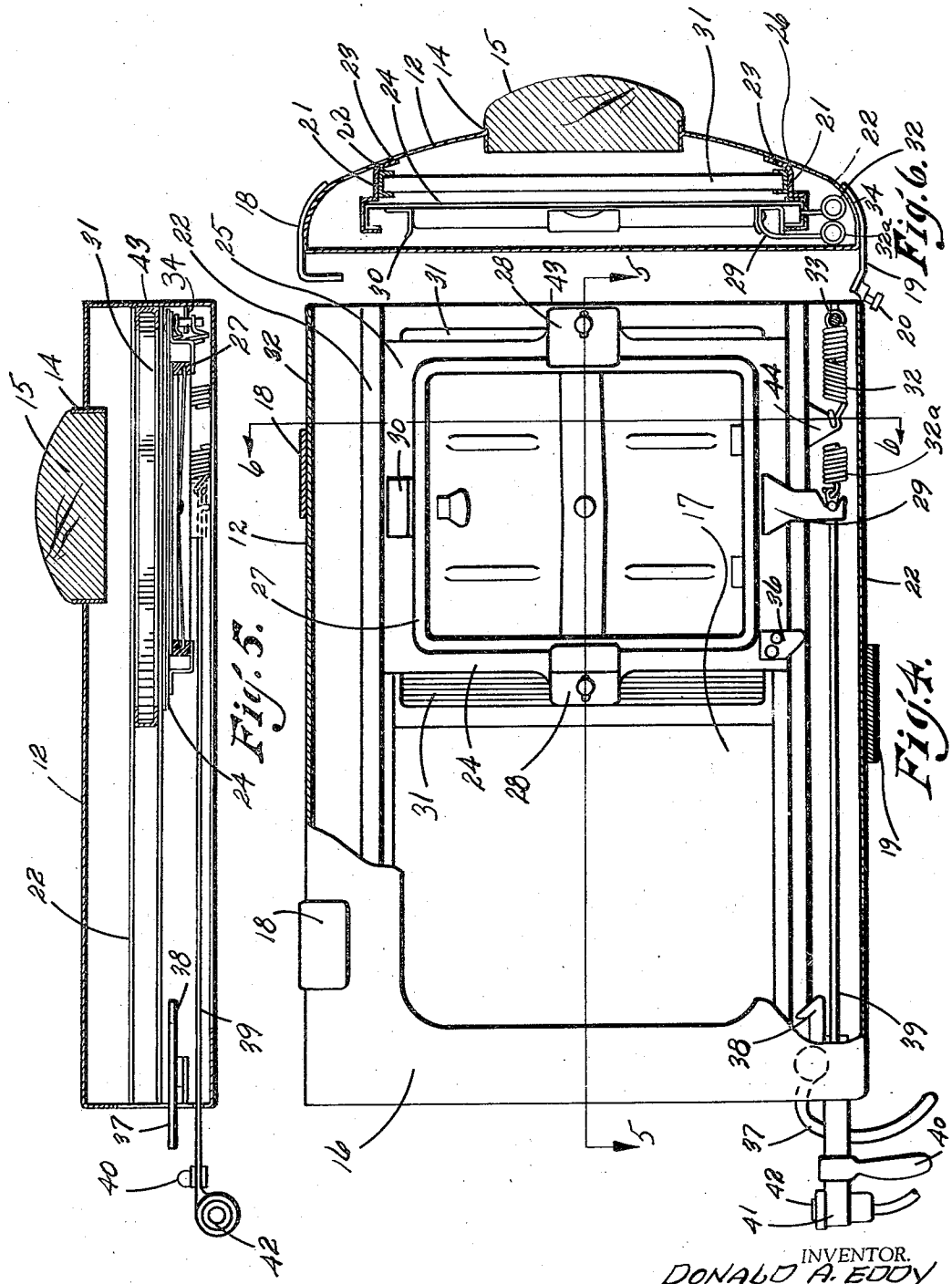


Fig. 4.



Fig. 5.



Fig. 6.

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# UNITED STATES PATENT OFFICE

2,174,738

## X-RAY CASSETTE TUNNEL

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7 Claims. (Cl. 250—66)

This invention relates to a cassette tunnel which is adapted to be used with an X-ray fluoroscopic apparatus for the purpose of visually inspecting and then optionally radiographing the interior of the human body or of other objects of which it is desired to inspect the interior.

This invention, which I call a cassette tunnel, is intended for mounting upon the fluoroscopic screen of a fluoroscopic apparatus so as to be readily detachable and shiftable so that the proper exposure location can be easily determined while the cassette is in X-ray proofed non-exposure position. Another purpose of the invention is to provide in such an apparatus, a quick acting handy cassette-shifting mechanism so that when the body or other object under inspection has been beheld through the fluoroscopic screen and it has been determined to radiograph what was seen, the cassette can be shifted almost instantaneously into radiographic position. By the use of such an apparatus, even transient phenomena within the human body can be photographed. The curved front of my device contributes to the ease of palpation while the doctor is observing the patient fluoroscopically.

In the drawings,

Figure 1 is a perspective view of an X-ray tilt table and control cabinet with fluoroscopic screen bearing my cassette tunnel in position for fluoroscopic inspection.

Figure 2 is a rear elevation of my tunnel, showing the cassette trigger and X-ray switch to the right.

Figure 3 is a front elevation of my tunnel, showing the trigger and switch at the left.

Figure 4 is a view corresponding to Figure 3 except that parts are broken away to show the interior mechanism.

Figure 5 is a horizontal section taken along the line 5—5 of Figure 4.

Figure 6 is a vertical cross-section taken along the line 6—6 of Figure 4.

Referring again to Figure 1, 10 is a swingable arm which is conventional on tilt tables and which bears upon its outer end a fluoroscopic screen 11, which is shown partly cut away. Behind the screen is shown the curved body 12 of my tunnel, the curved portion of which is directed toward the panel 13 of the tilt table.

Figure 2 shows the curved surface of the body 12, which is seen as the patient under inspection would see it in use. Toward one side of the body 12, there is an opening 14, which in practice is closed with a cork or balsa wood plug 15, which is shown in Figures 5 and 6. The plug has the function of more or less flattening body contours so as to allow closer inspection.

The body 12 of my device has a general cross-section which is like that of a partial hemisphere. A body, which is preferably made of sheet steel, is lined with lead sheet in its curved portion so as to prevent fogging of the film by the X-ray beam before exposure is desired. The rear part of the body 12 is a flattened rectangular frame 16, which is approximately the same dimensions as a conventional fluoroscopic screen attached to a tilt table. The central portion of the rear of body 12 is cut away to provide a rectangular opening 17 which is practically of the same dimensions as the actual exposed surface of the conventional fluoroscopic screen.

The top of frame 16 is provided with a pair of broad metal hooks 18, adapted to fit over the frame of the conventional fluoroscopic screen so that the body 12 hangs therefrom. Upon the lower edge of body 12, there is a single broad hook 19, through which is threadedly mounted a clamping screw 20. By the use of these hooks my tunnel can be suspended from and clamped to the conventional fluoroscopic screen used in connection with the tilt table, as shown in Figure 1.

Within the curved body 12, there are two sets of slides or channels 21 and 22, each comprising an upper slide and a lower slide. Each set, that is upper and lower, is mechanically attached to a supporting channel 23 of which there are also one at the upper interior and one at the lower interior of the tunnel body 12 and which are mechanically attached to the body, preferably by welding. The channels 21 and 22 are mechanically attached to the supporting members.

Slidable horizontally within the channels 22, there is a cassette carriage 24 which comprises a body sheet 25, and channel edges 26, which are bent rearwardly to a sliding fit within channel member 22. The body sheet has a large opening (not shown) adjacent which a cassette 27, is mountable by means of a pair of clamps 28; a rest 29 is also provided upon which the bottom edge of the cassette may rest. A top spring guide 30 is mounted upon the body sheet 25 for the reception of the top edge of the cassette.

At the front of the cassette carriage, but independent thereof, in a Lysholm grid 31 which is slidable horizontally within the channel 21. No special mechanism is provided for moving this grid, but it may be displaced by sliding it manually in front of the opening 14, or to the left of the tunnel as shown in Figure 4 to an inoperative position.

The motive power for the shifting of the cassette and its associated carriage is provided by a coil spring 32 which is mounted horizontally at the bottom of the tunnel body as shown in Figure 6 between pin 33 and eye bar 34 at the bottom edge of the cassette carriage, but it is not visible in Figure 4 because obscured by the

cassette rest 29. It can be seen, however, in Figure 6. It works in a similar slot in the lower channel member 22.

Below the lower channel member and the body frame 16, there is provided a trigger release mechanism, whereby the spring tension of spring 32 which is attached between a tab 44 on the cassette carriage, and the right hand wall 43 of the tunnel can be released to pull the cassette carriage and cassette to the right, seen in Figure 5. Th mechanism comprises a lug 36 which is attached to the lower edge of the cassette carriage 24 and a trigger 37 upon which is a hook 38 which is adapted to engage and retain lug 36 when the cassette frame is shifted to locked position to the left side (Figure 4) of the tunnel. For this operation, there is provided a shift rod 39 which extends along the tunnel body below the cassette carriage and is attached thereto through the cassette rest 29. A coil spring 32a is also attached to the rod 40 from the same anchorage point 33 as the spring 32 is fastened to. A handle 40 is located near the outer end of shift rod 39, so that the shift can be made from the outside of the tunnel. At extreme end of the rod 39, there is a hook 41 for the accommodation of the X-ray timer button 42.

In operation, the tunnel is slid onto the screen 11, the hooks 18 extending over the frame thereof. The clamp 20 is tightened. The patient now takes his place against the panel 50 of the tilt table between the tunnel and the panel. The tunnel is pressed against the patient so that the area to be examined is flattened by the plug 15. The cassette and its carriage 24 have been shifted to the left by pulling handle 40 to the left until lug 36 is engaged by trigger 38. Vision is now possible through screen 11 and opening 14, so the X-ray circuit is energized by pressing button 42 while fluoroscoping the patient. If it is desired to photograph the area, the trigger 37 is pulled to the left, thereby releasing cassette carriage 24, which is pulled to the right by spring 32 until the cassette is opposite opening 14. The timer button 42 is then pressed to activate the X-ray tube for an appropriate time. The cassette is then removed and reloaded.

During the radiographic operation the cassette carriage has been held firmly against the right hand wall 43 of the tunnel by the spring 32 pulling on tab 44. The shift rod 39 has also been retracted into the body of the tunnel by means of spring 32a so that the hook 41 has been brought within easy reach of the operator's hand, so that it is unnecessary to stretch in order to press the timer 42.

I claim as my invention:

1. A cassette tunnel comprising a body, hooks upon said body for attaching the latter to a fluoroscopic screen, said body having a curved front and an exposure opening therein, a cassette carriage within said body, a pair of channels for the sidewise movement of said carriage, means for retaining said carriage out of exposure position and means for pulling said carriage into exposure position when said retaining means is rendered inoperative.

2. A cassette tunnel comprising a body adapted to be attached to a conventional fluoroscopic screen, said body having a semicircular front, a plurality of longitudinal channels within said body, a Lysholm grid manually slidable in one pair of said channels, a cassette carriage slidable in a second pair of said channels, a spring adapted to pull said cassette carriage to radiographic position and a trigger adapted to hold said cassette carriage out of radiographic position until tripped.

3. A cassette tunnel comprising a body, hooks on said body for attaching the latter to a fluoroscopic screen, said body having a curved front and an exposure opening therein, a plurality of channels within said body, a cassette carriage slidably mounted between one pair thereof; a Lysholm grid slidably mounted to the front of said cassette carriage between another pair thereof, spring means for pulling said carriage into exposure position, a hooked trigger for retaining said cassette carriage out of exposure position against the tension of said spring means, said trigger being operable from outside said body to release the said carriage.

4. In a cassette tunnel, a lead-lined body having D shaped cross section, a pair of broad hooks at the top thereof, a clamp at the bottom thereof whereby said body may be attached to a fluoroscopic screen, said body having an exposure opening in its curved portion, an X-ray transparent plug in said opening, two pairs of parallel channel rails within said body at the top and bottom thereof, a Lysholm grid manually slidable over the exposure opening along the front pair of rails, a cassette carriage slidable within the rearward pair of rails, a coil spring arranged to pull the cassette carriage opposite the exposure opening, a manually operable trigger having a hook holding the cassette carriage against the tension of said spring, said trigger being operable manually from without said body and a hook attached to said body and adapted to hold an X-ray timer switch, said hook being in close proximity to said trigger.

5. A cassette tunnel according to claim 2 having in addition a rod extending parallel to the travel of the cassette carriage and beyond the body of said tunnel, said carriage being engageable by said rod whereby said cassette carriage may be pulled by means of said rod against the tension of the spring which tends to pull the cassette carriage to radiographic position, and a second spring extending between said rod and the tunnel body returning said rod to a position in which a substantial part of the length of said rod is within the tunnel body.

6. A cassette tunnel according to claim 3 having in addition a rod extending parallel to the travel of the cassette carriage and beyond the body of said tunnel, a lug on said carriage engageable by said rod and whereby said cassette carriage may be pulled by means of said rod against the tension of the spring which tends to pull the cassette carriage to radiographic position, and a second spring extending between said rod and the tunnel body returning said rod to a position in which a substantial part of the length of said rod is within the tunnel body.

7. A cassette tunnel according to claim 4 having in addition a rod extending parallel to the travel of the cassette carriage and beyond the body of said tunnel, a lug on said carriage engageable by said rod whereby said cassette carriage may be pulled by means of said rod against the tension of the spring which tends to pull the cassette carriage to radiographic position, and a second spring extending between said rod and the tunnel body returning said rod to a position in which a substantial part of the length of said rod is within the tunnel body.

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