May 10, 1960 R. S. GREEN ET AL 2,936,370

DEVICE FOR MARKING X-RAY NEGATIVES

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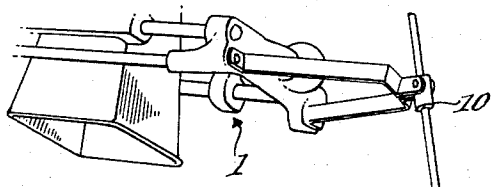
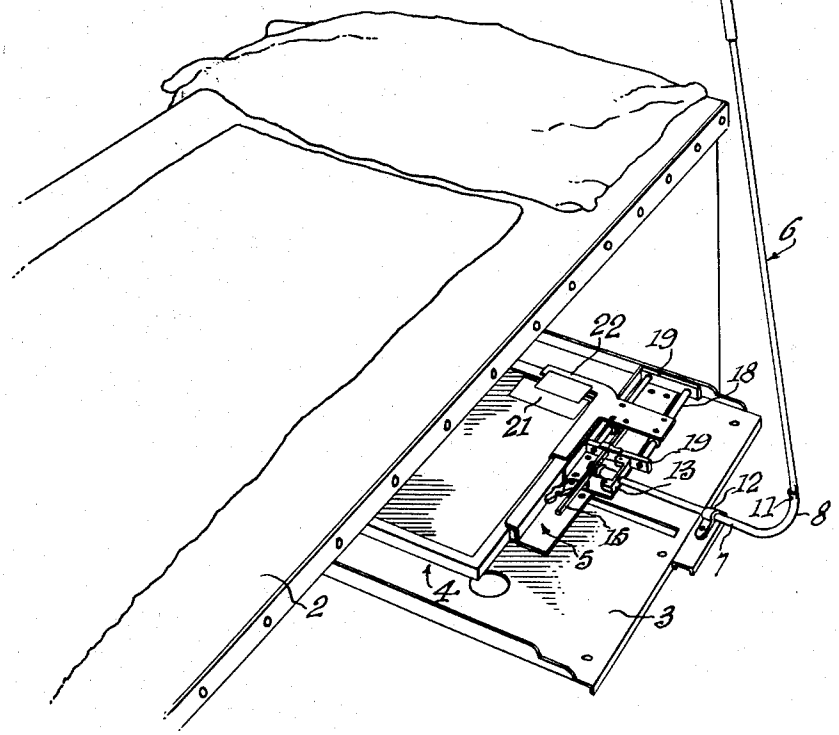


Fig. 1.



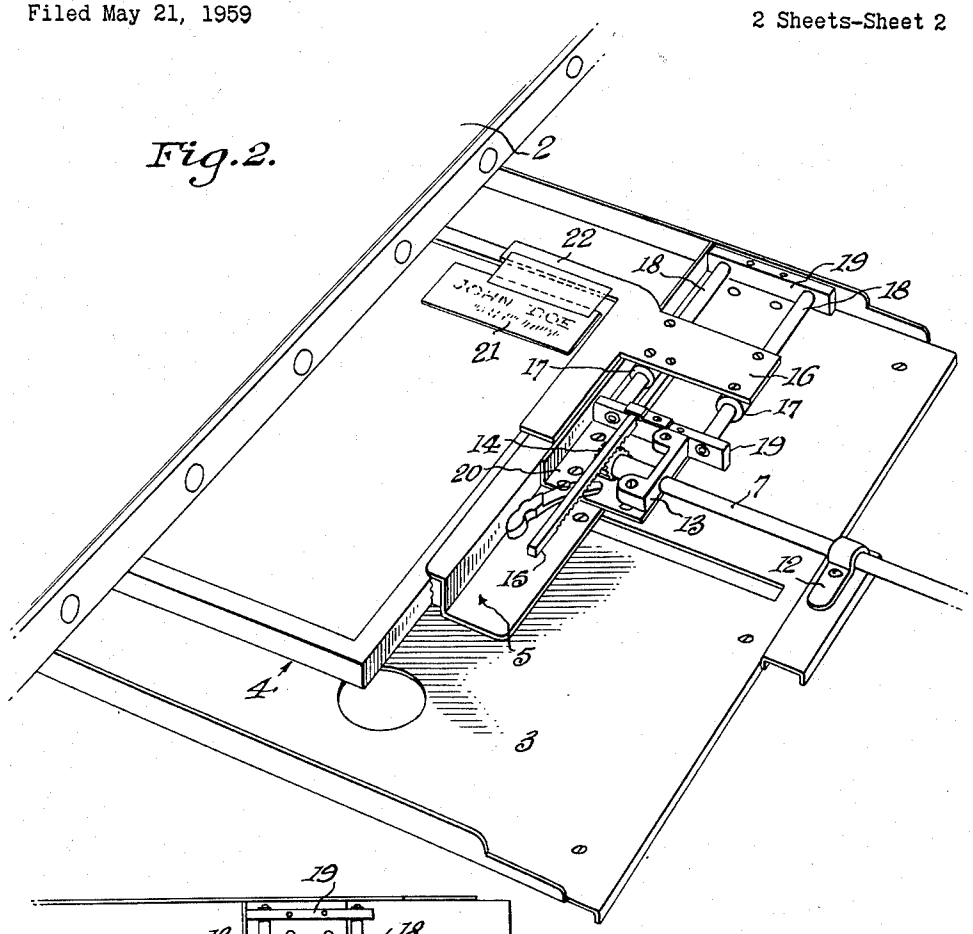
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Fig. 2.



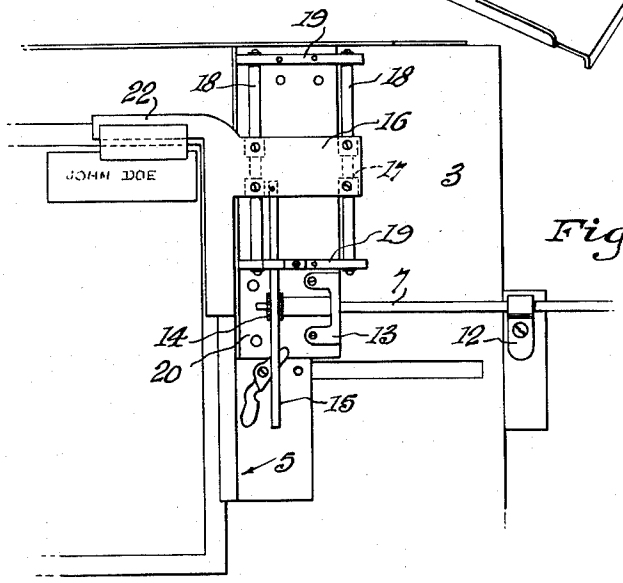


Fig. 3.

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DEVICE FOR MARKING X-RAY NEGATIVES

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4 Claims. (Cl. 250—67)

(Granted under Title 35, U.S. Code (1952), sec. 266)

The invention described herein may be manufactured and used by or for the Government for governmental purposes without the payment of any royalty thereon.

The present invention relates to a device for marking X-ray negatives and more particularly for marking X-ray negatives taken by body-section radiography.

Body-section radiography is known by a variety of names; but regardless of the particular name used, the purpose and principles of operation remain the same. Body-section radiography is radiography of a particular plane or layer of body structure, the purpose of which is to show detail in radiographs of structures, which in conventional radiography would normally be obscured by superimposition. In conventional radiography, absence of motion during exposure is essential; otherwise, movement causes blurring on the radiograph and destroys the sharpness of detail which is necessary. In body-section radiography, motion during exposure is essential, the proper movement in general being the movement of the X-ray tube in one direction and the X-ray film in the opposite direction.

The apparatus used in body-section radiography comprises a table, an adjustable fulcrum usually attached to one side edge of the table, an overhead X-ray tube, an arm pivoted on the fulcrum attached at one end to the X-ray tube and at the other end to a tray which is located under the table and carries the cassette. After the depth within the body of the part to be examined is determined, usually by means of conventional radiographs, the fulcrum is adjusted so that it is on the same plane as the part to be examined. Although both the overhead X-ray tube and the X-ray film carried by the cassette under the table move in opposite directions during the period of exposure in body-section radiography, since they are connected at opposite ends of the arm and the arm is pivoted at the fulcrum, there is no movement at the fulcrum and the section of the body at which the radiograph is taken. Consequently, the part to be examined is not blurred; whereas, those sections above and below the fulcrum are blurred by the movement. The result in the obtaining of a radiograph of a part within the depth of the body which in conventional radiographs would be obscured by superimposition of other parts lying above or below it.

The X-ray identification marking system used in body section radiography has been a troublesome procedure to radiologists for many years. Three methods have been used, but none has been satisfactory. In one method, the label is applied directly to the film by the use of large lead numbers; however, this method is unsatisfactory because the blurring effect produced by the movement of the X-ray tube and the X-ray film makes the numbers hardly readable and results in a considerable part of the film being occupied in order for the numbers to be recognized. In a second method, a typewritten label is used and is photographed by a light labeling method. This method is objectionable because the typewritten label must be reproduced 10 to 12 times for each individual examination; the labels are too small; and the human error in mixing the labels is a definite problem. In a third method, the film is shielded in part during the examination, and then after the complete set of body-section radiographs has been taken, it is re-exposed by a "burn-in" procedure in order to produce a practical, readable and positive identification for each film. This method is objectionable because of the time consuming effort and the increased human error induced due to the multiple steps through which the film must be processed and handled for each examination. Increased use of body-section radiography in recent years has created a great need for a satisfactory marking system.

It is an object of the present invention to provide a device for marking X-ray negatives simultaneously with exposure of the patient during body-section radiography.

It is another object of this invention to provide a device to achieve marking the X-ray negatives which results in clearly readable identification but eliminates costly film spoilage and wastage.

Still another object of the invention is to provide a device to achieve clearly readable markings on the X-ray negatives in body-sectional radiography but eliminate multiple handling by the operator, thereby greatly reducing the time required by the operator to conduct the examination, the possibility of human error, and the exposure of the operator to dangerous radiation hazard.

A further object of the invention is to provide a device which is simple in structure and inexpensive in cost.

Additional objects and a more complete understanding of the invention may be obtained by referring to the following description and claims taken in conjunction with the accompanying drawings which show an illustrative embodiment of the construction forming the basis of the invention and in which:

Fig. 1 is a perspective view showing in part the table, overhead X-ray tube and tray carrying an X-ray cassette partially inserted under the table, together with the invention as an accessory;

Fig. 2 is a perspective view in detail of the partially inserted tray and cassette with that portion of the invention which is mounted on the tray; and

Fig. 3 is a top view in detail showing that portion of the invention which is mounted on the tray.

Referring to Fig. 1, some of the standard items of the equipment used in taking body-section radiographs are shown as overhead X-ray tube apparatus **1**, table **2**, tray **3**, cassette **4**, and cassette clamp assembly **5**. The tray **3** is normally inserted under table **2** so that the film in cassette **4** is under the body of the patient who is in position on the table; however, tray **3** is illustrated in a partially inserted position in order that the instant invention may be visible and its parts identified and described.

Referring further to the drawings, vertical bar **6** is attached at its upper end to the frame of overhead X-ray tube apparatus **1**, and at its lower end to horizontal bar **7**. Horizontal bar **7** has at one end an upwardly curved elbow **8** which receives vertical bar **6**. Vertical bar **6** is connected at its upper end by means of swivel joint **10** and at its lower end by means of swivel joint **11**, permitting movement of tray **3** into and out of position under table **2**. Horizontal bar **7** is held in position by slip bearing **12**, which permits rotational and slidable movement, and by stationary fitted bearings **13** which permits only rotational movement. Attached to horizontal bar **7** at the end adjacent bearing **13** is pinion gear **14** which operates rack **15**. Base **20** is attached to cassette clamp **5** and supports bearing **13** and holders **19**. Rack **15** is attached to carriage **16** and slidably moves the carriage by means of washer type bearings **17** sliding on rods **18** which are held in position by holders **19** attached to base **20**. Label **21** carries standard X-ray opaque letters and numerals to

achieve desired identification of the X-ray film contained within cassette 4, and the label is removably attached to arm 22 of carriage 16 so that the label moves slidably on the surface of cassette 4 in response to the movement of carriage 16.

When body-section radiographs are taken, as generally explained in a previous paragraph, overhead X-ray tube apparatus 1 and tray 3 carrying cassette 4 move relative to each other in the conventional manner. Movement of overhead X-ray tube apparatus 1 is also transmitted through vertical bar 6, curved elbow 8, horizontal bar 7, pinion gear 14, rack 15 and carriage 16 to label 21 causing label 21 to move relative to cassette 4. Thus, movement of overhead X-ray tube apparatus 1 is transmitted to label 21 in such a manner that the identifying data contained on the label is not blurred but is in focus, thereby giving a readable marking on the film obtained simultaneously with the body-section radiograph.

We claim:

1. A film marking device for use in an X-ray apparatus for taking body-section radiographs including a support member, an adjustable fulcrum attached to said support member, an X-ray tube mounted above said support member, an arm pivoted on the fulcrum having one end attached to said X-ray tube and the other end attached to a tray under said support member, and a cassette releasably mounted on said tray, said film marking device comprising, in combination, transport means for a label having thereon X-ray opaque identifying indicia, said transport means carrying the label above the surface of said cassette for slidable movement thereover, means for moving said label transport means relative to said cassette and across a portion thereof, and means for connecting said X-ray tube to said label transport means whereby said label moves in response to movement of said X-ray tube.

2. A film marking device for use in an X-ray apparatus for taking body-section radiographs including a support member, an adjustable fulcrum attached to said support member, an X-ray tube mounted above said support member, an arm pivoted on the fulcrum having one end attached to the X-ray tube and the other end attached to a tray under said support member, a cassette releasably mounted on said tray, said film marking device comprising in combination a carriage for a label having thereon X-ray opaque identifying indicia, said carriage supporting the label above the surface of said cassette for slidable movement thereover, gear drive means connecting said X-ray tube and said carriage to transmit movement of said X-ray tube to said carriage to move the label relative to said cassette.

3. A film marking device for use in an X-ray apparatus for taking body-section radiographs including a support member, an adjustable fulcrum attached to said support member, an X-ray tube mounted above said support member, an arm pivoted on the fulcrum having one end attached to the X-ray tube and the other end attached to a tray under said support member, a cassette releasably mounted on said tray, said film marking device comprising in combination a carriage for a label having thereon X-ray opaque identifying indicia, said carriage supporting the label above the surface of said cassette for slidable movement thereover, a plurality of parallel rods in fixed spaced relationship carried by said tray to which said carriage is attached for slidable movement thereon, a rack and pinion gear with said rack attached to said carriage, and connecting means between said pinion gear and said X-ray tube to transmit movement of said X-ray tube to said carriage to move the label relative to said cassette.

4. A film marking device for use in an X-ray apparatus for taking body-section radiographs including a support member, an adjustable fulcrum attached to said support member, an X-ray tube mounted above said support member, an arm pivoted on the fulcrum having one end attached to the X-ray tube and the other end attached to a tray under said support member, a cassette releasably mounted on said tray, said film marking device comprising in combination a carriage for a label having thereon X-ray opaque identifying indicia, said carriage supporting the label above the surface of said cassette for slidable movement thereover, a plurality of parallel rods in fixed spaced relationship carried by said tray to which said carriage is attached for slidable movement thereon, a rack and pinion gear with said rack attached to said carriage and parallel to said parallel rods, a horizontal bar rigidly connected at one end to said pinion gear and having at its other end an upwardly curved elbow, and a vertical bar connected between said elbow and said X-ray tube, said vertical bar transmitting movement of said X-ray tube to said horizontal bar whereby a rotational movement is imparted to said horizontal bar and pinion gear causing said carriage to slidably move the label relative to said cassette.

No references cited.