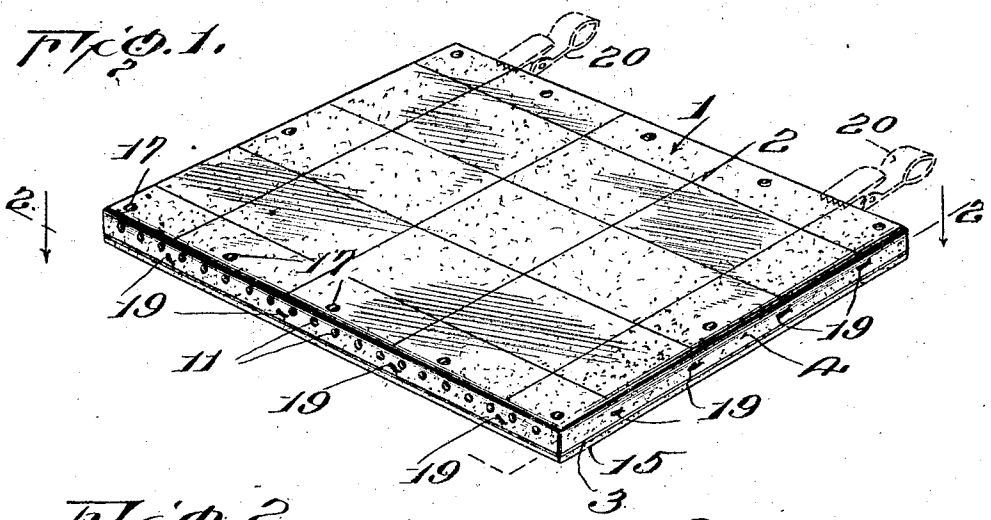
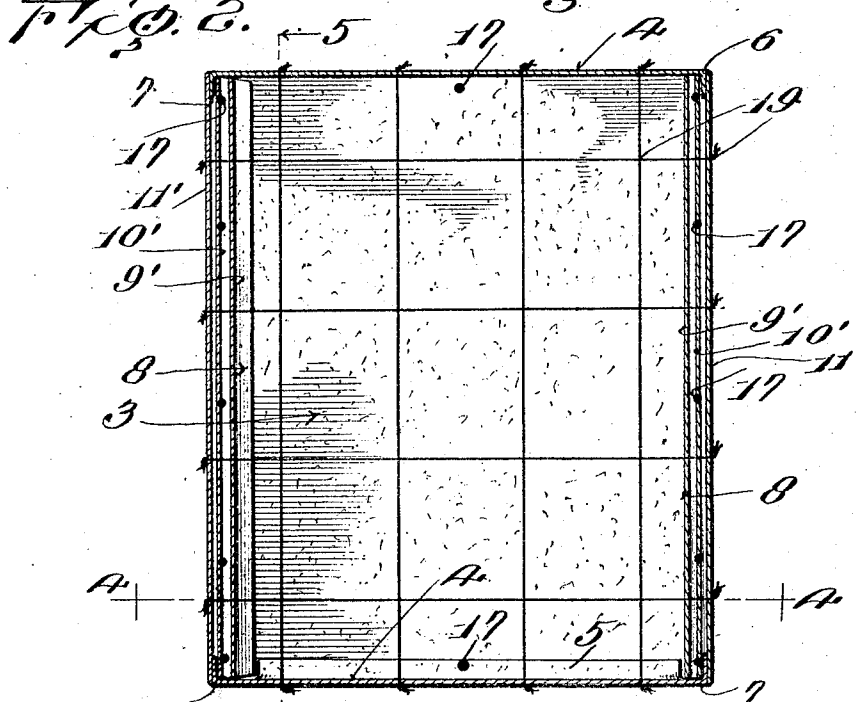
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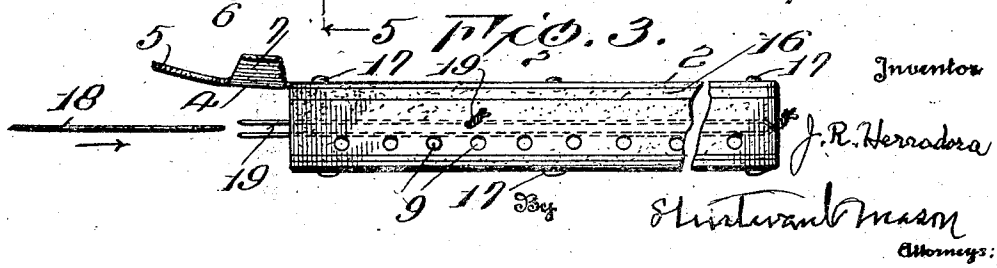
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DEVELOPING HOLDER FOR X-RAY FILMS

Filed April 29, 1924 2 Sheets-Sheet 1




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FIG. 4.

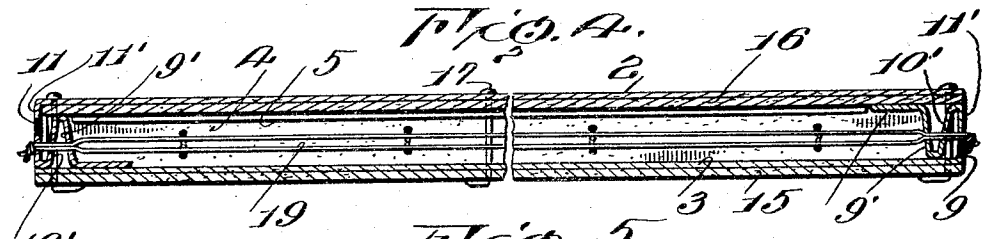



FIG. 5.

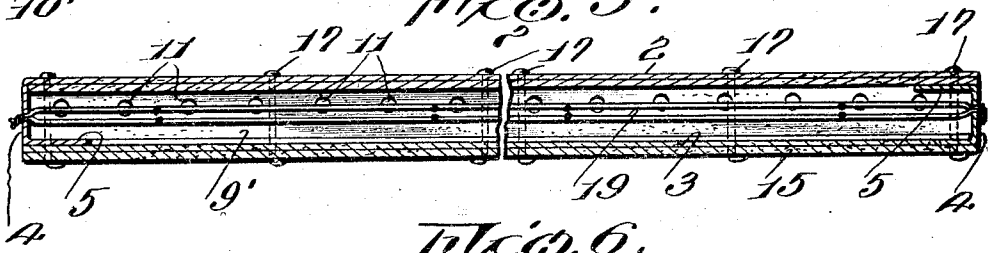



FIG. 6.

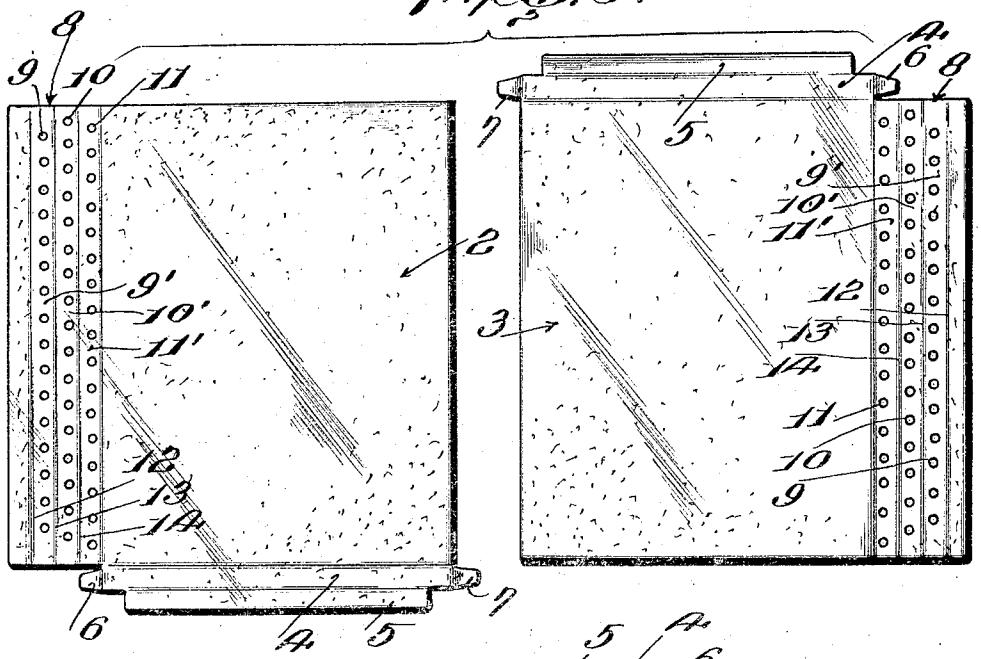
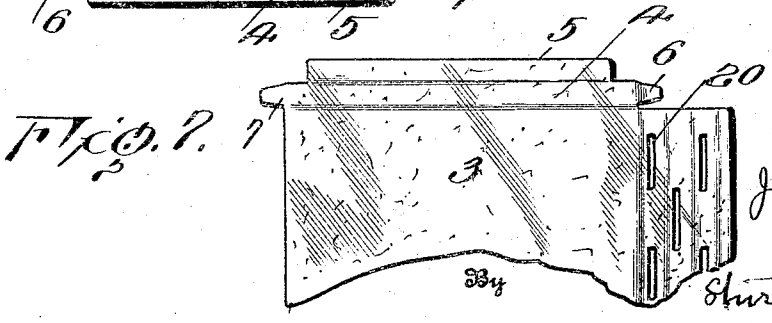



FIG. 7.




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# UNITED STATES PATENT OFFICE.

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## DEVELOPING HOLDER FOR X-RAY FILMS.

Application filed April 29, 1924. Serial No. 709,832.

*To all whom it may concern:*

Be it known that I, JUAN RAFAEL HERRADORA, a citizen of the Republic of Nicaragua (his first naturalization papers having been taken out in February, 1923), residing at Holtsville, in the county of Suffolk, State of New York, have invented certain new and useful Improvements in Developing Holders for X-Ray Films, of which the following is a description, reference being had to the accompanying drawing and to the figures of reference marked thereon.

My invention relates to improvements in developing holders for X-ray films.

The object of my invention is to provide a holder for X-raying films, which are sensitive on both sides, so that the film is supported therein out of contact with the walls thereof in such a position that the same can be developed by day light by introducing the holder in the tank containing the developing and fixing fluids without the use of any dark room and red lights as it is necessary in the current practice of to-day.

Another object of my invention is to provide a holder of this character in which the film should be placed therein by the manufacturer of films and delivered to the practitioner in such a way that every film is contained by its own holder, of course there will be as many holders as films and the latter can be printed by direct exposure of the holder to the X-rays and developed afterwards in the light, without any possibility of light striking the film, and yet allow the free circulation of the developer through the holder over both faces of the film, thus saving the practitioners the time employed in the handling of the films in the dark room as it is done at present.

A further object of my invention is to provide a holder of this character which is made of black paper, paste, cardboard, etc., whereby X-rays or any other kind of radiation or emanation will pass therethrough and print the film or any other kind of sensible material through the holder and at the same time provide a cheap and effective holder adapted to be used but once and whereby the film is more easily handled, readily secured and supported within the holder.

A still further object of my invention is to provide a holder which supports the film in the center by means of double strands of very thin wire, which under the action of the X-ray will print a shape that can be seen over the screen after it is developed. The quadratic sections of a known size in centimeters printed over the films by the strands of wire being useful in the calculation of the area or location of the radiographic findings or the references of such findings to the other points of the region examined.

A still further object of my invention is to provide a holder of this character which avoiding the use of the dark room, red lights and the direct handling of the films, makes a considerable reduction in the expenses for installations of X-ray offices. This advantage being of a real importance for the small practitioner, the public health, the Army or any kind of emergency X-ray station in which the securing of an electric current will enable the practitioner to make a radiologic diagnosis.

In the accompanying drawings:

Figure 1 is a perspective view of my improved film holder.

Figure 2 is a horizontal sectional view taken on the line 2—2 of Figure 1.

Figure 3 is an end view showing the side flap open for the insertion of the film within the holder between the supporting wire.

Figure 4 is a transverse sectional view taken on the line 4—4 of Figure 1.

Figure 5 is a longitudinal sectional view taken on the line 5—5 of Figure 2 looking in the direction of the arrow.

Figure 6 is a plan view of the two blanks of which my improved holder is formed.

Figure 7 is a plan view of a modified form showing elongated openings for allowing passage of the developer into the holder.

Referring now to the drawings 1 represents my improved holder which as shown is of a rectangular form but could be made square and of a size to hold and support different size X-ray films.

As shown in Figure 6 of the drawing the improved holder is formed of two blanks 2 and 3 made of black cardboard and exactly alike and each having at one end the flaps 4 which form the ends of the holder as will be hereinafter more fully described. The flap 4 is provided with a reduced flap 5 which forms the attaching means as will be later described. The flap 4 at each end is provided with the tongues 6 and 7 which engage the side walls of the holder and are cemented thereto for holding the end flap or wall 4 in

its position and tightly closing the end of the holder. One side wall of each blank is provided with a flap 8 provided with three rows of openings 9, 10 and 11 arranged in staggered relation as shown in Figure 6 and having scores 12, 13 and 14 arranged between the rows of openings so that they may be bent into the form shown in Figure 4 of the drawings to form the side walls of the holder with three walls 9', 10' and 11' and the openings being staggered, the light will not penetrate the holder, but allows of the free passage of the developing fluid into the holder. I have shown and described the blank 2 constructed in this manner and it will be understood that the blank 3 is constructed exactly alike, and like reference numerals indicate like parts. When the two blanks are folded as shown in Figures 4 and 5 of the drawings, with the outer face of the blank 3 cemented to the heavy card board backing 15 and the inner face of the blank 2 cemented to the heavy card board 16, it will be seen that a very rigid holder is formed of paper or card board.

The whole frame is rigidly secured together by rivets 17 or the like, arranged close to the edge so as not to engage or not to interfere with the film 18 which is centrally supported in the holder between its upper and lower faces. The supporting means for the film consist of a series of strands of wire 19 arranged in pairs and extending transversely and longitudinally of the frame at equal distance one from the other and secured to the end and side walls mid-way between the upper and lower faces of the holder. As shown in Figures 4 and 5, these wires 19 extend through the end and side walls and are twisted together on the outside thereof and bent upwardly or downwardly to prevent them from slipping and whereby the film is supported with the holder between the upper and lower faces thereof. The film can be inserted between the wires as shown in Figure 3 of the drawings and the end flap closed and cemented as herebefore described.

The holder is immersed or otherwise given a bath of paraffin before the film is inserted which makes the holder impervious to the developing fluid and whereby the paper holder will at all times hold its proper shape so that the film can be printed by the exposure of the holder to the X-rays and developed without necessity of any dark room by introducing the holder into the tank containing the developing and the fixing fluid.

In the modification shown in Figure 7 instead of having the round openings such as shown in Figure 6, I have shown the elongated openings 20 arranged in staggered relation, the operation of which will be the same as that shown in Figure 6.

The holder supports the film in the center by strands of very thin wire disposed in pairs. By the action of the X-ray these wires will print over the film quadratic sections that can be seen after the development of the film. These double strands of wire are disposed at the same distance one from the other (distance measured in centimeters) thus forming quadrangular sections that will appear printed in the film and in many instances will allow the practitioner to calculate the area of the radiographic findings or to refer them to other points of the anatomical region examined.

The exact position of the strands of wire is shown in the outside by straight lines printed over the external surface of the holder.

From the foregoing description it will be seen that the film is placed in the holder between the pairs of longitudinal and transverse wires and supported mid-way between the upper and lower faces of the holder. The holder is then tightly sealed by closing the end flaps and the holder can then be exposed to the ordinary light without any possibility of the rays of light striking the film, the holder can then be suspended in a tank containing the developing fluid by means of spring clips 20 and the fluid can readily pass through the series of openings 9, 10 and 11 on both sides of the film and by moving the holder in the bath the fluid will travel back and forth on each side of the film and fully develop the same. After the film is developed the holder can be removed and the film allowed to dry, and is ready to be interpreted.

Having thus fully described my invention what I claim is:—

1. A film holder comprising a paper enclosure having a number of spaced walls forming side walls having openings arranged in staggered relation whereby a developing fluid may pass to the enclosure and at the same time preventing light from entering the enclosure.

2. A film holder comprising a paper enclosure, means for supporting a film in the enclosure between the upper and lower faces and said receptacle having two of its opposite edges closed by double walls provided with staggered openings for allowing passage of a developing fluid, into the enclosure and preventing light from entering the same.

3. A film holder comprising an enclosure, means carried by two opposite sides for supporting the film in the holder between the upper and lower faces, the two opposite edges of the holder closed by double walls having openings arranged in staggered relation to allow the passage of fluid to the enclosure and prevent the passage of light to the enclosure.

4. A film holder comprising a paper en-

closure, means for supporting a film in the enclosure between the upper and lower faces thereof and two opposite edges of the enclosure having a series of walls having openings arranged in staggered relation to allow the passage of a fluid to the enclosure but preventing the light from entering the same.

5. A film holder comprising two blanks of paper having flaps forming two end walls and flaps forming side walls of several thicknesses spaced apart and having staggered openings to allow the passage of a developing fluid into the enclosure formed thereby but preventing light from entering the same.

6. A film holder comprising a paper enclosure having two side walls provided with wires extending through the enclosure adapted to support the film between the upper and lower faces of the enclosure and the end walls closed by several flaps having openings arranged in staggered relation and adapted to allow the free passage of a developing fluid to the enclosure but preventing light from entering the same.

7. A film holder comprising a paper enclosure, impervious to the developing fluid, means for supporting the film in the enclosure between the upper and lower faces thereof, and two opposite sides of the enclosure closed by a series of spaced flaps having openings arranged in a staggered relation to allow the free passage of a developing fluid into an enclosure but preventing light from entering the same.

8. A film holder comprising two blanks having flaps forming two end walls and flaps forming two side walls of several thicknesses held in spaced relation and having openings arranged in staggered relation to allow the free passage of fluid to the holder and to prevent light from entering the same.

9. A film holder comprising a paper enclosure, means for supporting the film in the center by strands of very thin wire, conveniently disposed and at some distance one from the other and printing over the screen, after the action of the X-ray, quadratic sections to be used as references for the radiographic findings, the exact situation of the wires being shown externally by means of straight lines printed over the external surface of the holder.

10. A film holder comprising a paper enclosure, having flaps forming side walls of several thicknesses spaced apart, and having staggered openings to allow the passage of a developing fluid into the enclosure and preventing light from entering the same.

11. A film holder comprising a paper enclosure, having spaced wires extending there across intermediate its upper and lower faces, and flaps forming side walls of several thicknesses spaced apart, and having staggered openings to allow the passage of a developing fluid into the receptacle, and preventing light from entering the same.

12. A film holder comprising a paper enclosure, a series of wires arranged in pairs and held in spaced relation to support the film between the upper and lower faces of the enclosure, and flaps forming side walls of several thicknesses spaced apart, and having staggered openings to allow the passage of a developing fluid into the enclosure, and preventing light from entering the same.

13. A film holder comprising a paper enclosure, having a series of wires extending across the same between the upper and lower faces thereof and arranged in pairs and adapted to support a film, and said enclosure having a series of walls having openings arranged in staggered relation to allow the passage of a developing fluid into the enclosure, and preventing light from entering the same.

In testimony whereof, I affix my signature.

JUAN RAFAEL HERRADORA.