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M. LOEBELL

GRID FOR PROTECTING RÖNTGEN IMAGES AGAINST SECONDARY RAYS

Filed March 29, 1924

Fig. 1.

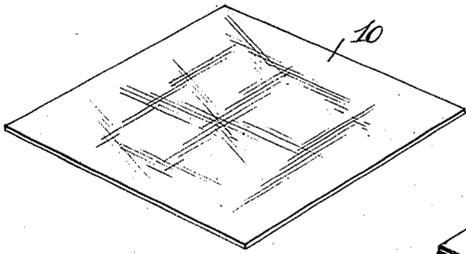


Fig. 2.

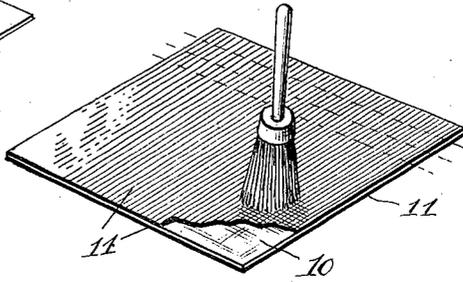


Fig. 3.

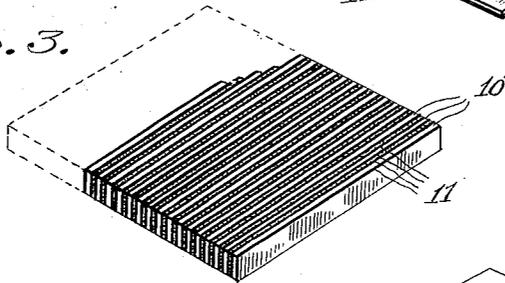


Fig. 4.

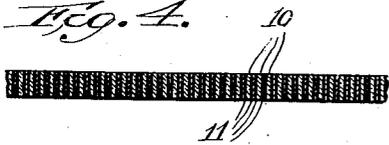


Fig. 5.

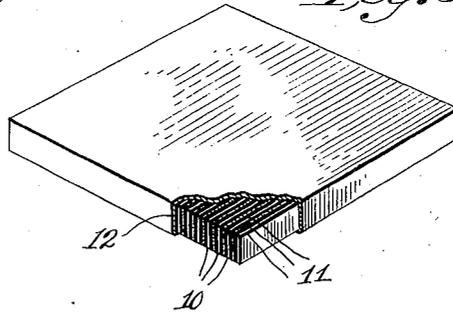
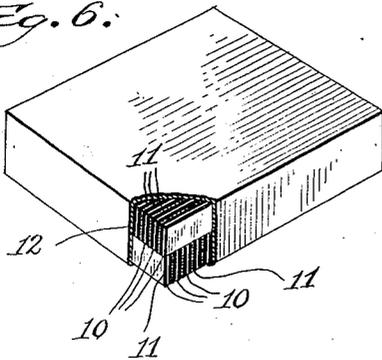


Fig. 6.



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# UNITED STATES PATENT OFFICE.

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GRID FOR PROTECTING RÖNTGEN IMAGES AGAINST SECONDARY RAYS.

Application filed March 29, 1924. Serial No. 702,995.

To all whom it may concern:

Be it known that I, MAURICE LOEBELL, a citizen of the United States of America, and a resident of Zanesville, county of Muskingum and State of Ohio, have invented certain new and useful Improvements in Grids for Protecting Röntgen Images Against Secondary Rays, of which the following is a full and clear specification.

This invention has relation to that type of grid composed of a multiplicity of extremely thin layers of substances pervious to the Röntgen rays and impervious thereto, the pervious layers alternating with the impervious layers or thicknesses, the grid being so constructed that the layers are presented edgewise to the Röntgen tube, so that the primary rays will pass directly through the pervious layers to the photographic plate or the fluoroscopic screen, and the secondary rays, striking the plate at an oblique angle to the primary rays, will be broken up and absorbed by the metallic barriers extending through the grid. The object of the present invention is to simplify the method of making such a grid, and to produce a grid of minimum weight and without mechanical devices or attachments to render the same useful, that will be highly efficient in destroying and absorbing the secondary rays and eliminate the distortion resulting from curved grids and grids operated by mechanical devices and attachments preventing maximum proximity of grid to film and requiring a minimum of exposure, as more fully hereinafter set forth.

In the drawing, Fig. 1 is a perspective view of a sheet of paper or celluloid for making the pervious layers;

Fig. 2 is a similar view of said sheet coated on each side with a layer of colloid material containing salts of a heavy metal;

Fig. 3 is a perspective view, of a slab made up of narrow strips of the coated material shown in Fig. 2;

Fig. 4 is a vertical cross-sectional view through a fragment of the slab shown in Fig. 3;

Fig. 5 is a perspective view of a complete plate or slab with the varnish coating broken away;

Fig. 6 is a view similar to Fig. 5 showing a superposed-plate arrangement.

In constructing my grid, I prefer to proceed specifically as follows: I coat a sheet of celluloid 10 or paper or other substance pervious to the Röntgen rays, on both surfaces, with a very thin layer of colloid material 11 into which the salts of a heavy metal, such as silver bromide or iodide, or pulverized metal, is incorporated, the colloid material being applied with a brush or otherwise. After this sheet is dried, I cut it into strips of required length and width and glue those strips, face-to-face, together by means of shellac or other adhesive substance pervious to Röntgen rays, thus building up a slab or plate of the desired width and thickness, the layers of celluloid or other pervious material alternating with the layers of metalliferous colloid material, these layers having their edges at the face of the plate or slab.

The plate or slab thus built up is dried under pressure in a suitable frame or press, and, when the plate is preferably dried, the surfaces are scraped, sand-papered and polished; then varnish 12 is applied to the plate, preferably three coats, and then the plate is polished again. This varnish acts not only as an adhesive for binding the edges together, but also as an absorbent of an almost unappreciable amount of secondary radiation from the grid layers. The resulting product is a hard smooth slab or plate, and it will be understood, of course, that the plate is made flat and further that the strips of celluloid or paper may be wound spirally with of course the metalliferous colloid material between the layers, so as to thereby produce a circular slab or plate.

It is obvious that, as shown in Fig. 6, two of the slabs or plates herein described may be arranged one upon the other, with the layers running at right-angles to each other, if desired. This superposed arrangement of the plates will be advantageous in that the secondary rays from whatever source they emanate will be entirely destroyed by the impervious barriers embodied in each grid. It will be further understood that, instead of mixing a metallic salt with colloid materials, I may employ powdered metal of high atomic weight mixed with an adhesive substance such as glue, shellac, etc.; and it will be obvious further that the salts of heavy metal may be mixed with

glue, shellac, etc., and be applied to the sheets of paper, celluloid, etc., by spreading or painting thereon.

What I claim is:

5 1. The method herein described of making a Röntgen ray grid consisting in coating strips of material pervious to Röntgen rays on both sides with a colloidal substance carrying the salts of a heavy metal, drying  
10 the strips thus coated, gluing together a multiplicity of these strips face-to-face, and then finishing the plate or slab thus formed by polishing the same.

15 2. The method herein described of making a Röntgen ray grid consisting in coating strips of material pervious to Röntgen rays on both sides with a colloidal substance carrying the salts of a heavy metal, drying  
20 the strips thus coated, gluing together a multiplicity of these strips face-to-face, and then finishing the plate or slab thus formed by polishing the same, said plate before the finishing step being provided with a coating of varnish or the like.

25 3. A Röntgen ray grid composed of a multiplicity of alternating layers of material pervious to Röntgen rays and material impervious to Röntgen rays, the latter being in the form of a colloidal substance  
30 mixed with salts of a heavy metal.

4. A Röntgen ray grid composed of a

multiplicity of alternating layers of material pervious to Röntgen rays and material impervious to Röntgen rays, the latter being in the form of a colloidal substance  
35 mixed with salts of a heavy metal, the plate thus formed being coated with varnish or the like and finished by polishing.

5. A Röntgen ray grid composed of a multiplicity of independent alternating layers of material pervious to Röntgen rays and material impervious to Röntgen rays, the latter being in the form of metal mixed in an adhesive substance spread between the pervious layers and adhering thereto in  
45 order to fasten them together and thus form a unitary mass.

6. A Röntgen ray grid composed of a multiplicity of separate alternating layers of material pervious to Röntgen rays and material impervious to Röntgen rays, the latter being in the form of a metal mixed in an adhesive substance placed between the pervious layers and adhering thereto in  
55 order to fasten them together and thus form a unitary mass of minimum weight and permitting close proximity of object to the photographic plate.

In testimony whereof I hereunto affix my signature.

MAURICE LOEBELL, M. D.