

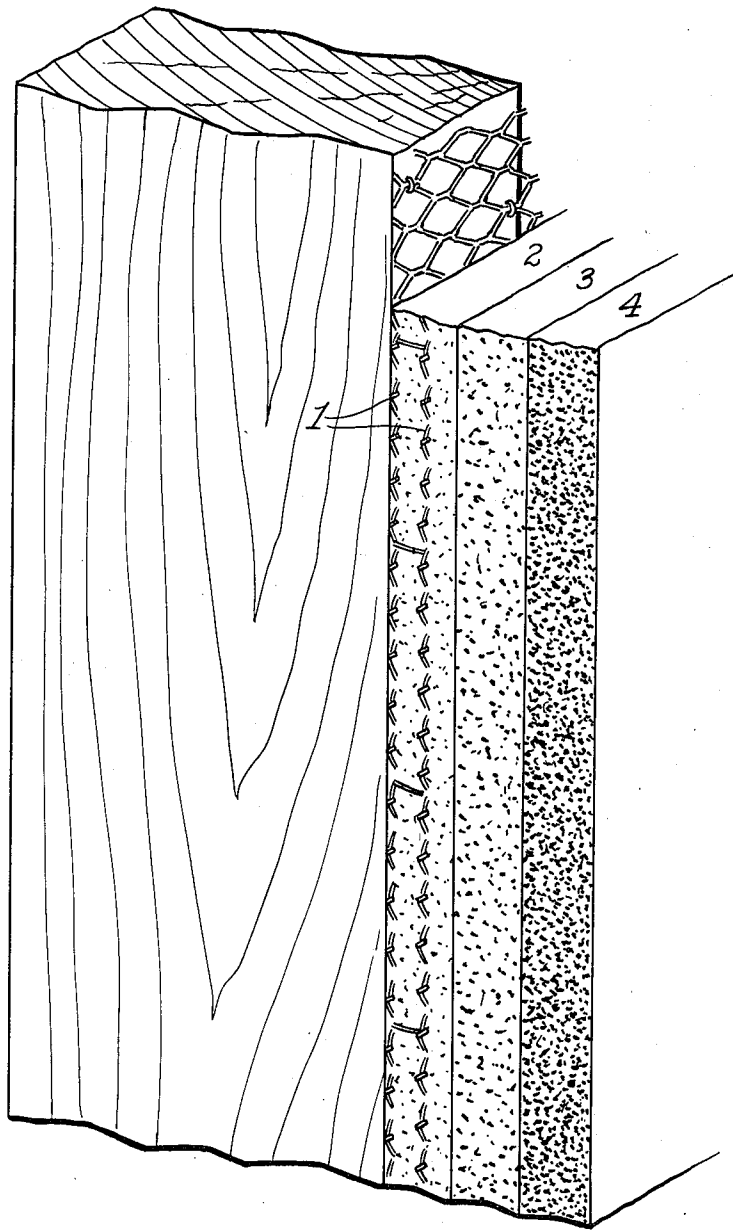
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P. E. HARTH

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PLASTER OR CONCRETE OPAQUE TO X-RAYS

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PLASTER OR CONCRETE OPAQUE TO X-RAYS.

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To all whom it may concern:

Be it known that I, PHILIP E. HARTH, a citizen of the United States, and residing at St. Louis, State of Missouri, have invented the new and useful Improvement in Plaster or Concrete Opaque to X-Rays, of which the following is a specification.

This invention relates to the art of plastering, and more particularly to wall constructions adapted to render the wall opaque to X-rays.

It is a well known fact that X-rays will penetrate practically every substance to a greater or less extent. Furthermore these rays are invisible to the human eye and their presence cannot be detected, except by the use of suitably designed instruments. In the operation of apparatus for producing X-rays, the rays may be sent out in all directions from the apparatus and unless intercepted by suitable opaque walls, they are liable to penetrate to unknown distances so that their presence may be detected in rooms adjacent to that in which the operation is being carried on. It is furthermore well known that the human body when subjected to this form of radiation undergoes permanent alterations of a nature which promotes the growth of cancer and similar ailments. The physiological effect of these rays seems to depend not only upon the intensity of the radiation, but also upon the length of time during which the subject is exposed to the radiation. It is, therefore, dangerous for a person to be exposed to even a radiation of feeble intensity if such exposure continues for a considerable time. It is, therefore, a paramount necessity that X-ray rooms in hospitals and similar institutions be carefully protected against the escape therefrom of X-ray radiation, since the same would be dangerous to persons in adjoining rooms.

According to the present practice, the walls of X-ray rooms are rendered substantially opaque to X-rays by lining the walls with sheet lead, which substance has been found to offer a considerable resistance to the passage of these rays. Such a lead lining is, however, very expensive and difficult to install. It also presents to the patient entering such a room for treatment a very formidable appearance, which experience has shown has an effect on the patient's nervous condition. It is desirable, there-

fore, to provide a wall covering which while offering a high resistance to the penetration of X-rays, will at the same time present an appearance similar to that of the walls of ordinary construction.

A method of providing such a wall construction consists in mixing a plaster with ingredients presenting a high resistance to the passage of X-rays. Such an ingredient is barium sulphate and plaster containing powdered barium sulphate and ordinary silica sand has been proposed for this purpose. Such a plaster has been found, however, to offer a comparatively feeble resistance to the passage of X-rays, so that a wall so constructed would permit the escape of a dangerous quantity of radiation. One reason for the failure of such a plaster is that while the barium sulphate ingredient has a high opacity for X-rays, the silica ingredient has very little. Furthermore the silica, being in the form of a coarse sand, occupies the greater bulk of the wall so that the effective thickness of barium sulphate which the rays must penetrate is comparatively small.

An object of this invention, therefore, is to provide a wall construction which will have an appearance approaching that of the ordinary plaster construction and at the same time be opaque to X-rays.

Further objects will appear from the following disclosure, taken in connection with the accompanying drawing which illustrates a wall constructed in accordance with this invention.

In accordance with this invention, a plaster is formed using as an ingredient a sand opaque to X-rays. Such a sand is composed of ground barite ore. This sand contains a high percentage of barium sulphate and has, therefore, a high opacity to X-rays. When the plaster is made with such barite sand as an ingredient, the bulk of the wall is occupied by the barium sulphate sand so that the opacity thereof is greatly increased. In order to further increase the opacity of such a wall, the spaces between the grains of sand may be filled with powdered barium sulphate or similar ingredient opaque to X-rays. Thus not only is the main body of the wall composed of opaque sand, but the spaces between the sand grains are also filled with an opaque substance. In order, therefore, to provide a

suitable opaque plaster, it is only necessary to provide a binder for the above-named ingredients so that the same may be worked up into a concrete or plaster which may be applied to a wall in the usual way. A suitable plaster for this purpose may be made up of a powdered barium sulphate, barite sand and Portland cement. These may be mixed in suitable proportions. A mixture of one part of powdered barium sulphate, two parts of barite sand, and one part of cement has given good results. These proportions may be, of course, varied to suit the particular application.

In applying this plaster to a wall, it has been found advantageous to apply the same in successive layers with the outer layers containing a greater proportion of opaque material. This may be done by increasing the proportion of the powdered ingredient in the outer layers, since the greater the proportion of this powder, the more dense will be the opaque material in that layer. By making the inner layers of the wall with a less proportion of powder, this more expensive ingredient is saved so that the cost of construction is thereby reduced.

A method of applying to a wall which has given good results is as follows: Two sheets of expanded metal lath 1 are wired together as indicated in the drawing, leaving a space of about one-half inch between the two sheets. The barium sulphate cement is then applied in successive coats. The first coat 2 may consist of one part of barium sulphate powder; two parts of barium sulphate sand and one part of cement. This may be followed by a second coat 3 of one part of powder, one part of sand and one part of cement. The third coat 4 may consist of two parts of powder and one part of cement. The depth of shading in the drawing indicates the increasing proportions of powder. Both sides of the expanded metal lath may be covered thus making the walls for two rooms and increasing the total thickness. A suitable color effect may be obtained by mixing color ingredients with the outer coat. Thus the finished wall may be given the appearance of either a white plaster wall or of a suitably tinted wall. Such a wall will have a very much more pleasing effect on the patient than will a lead lined wall.

It will be clear, therefore, that this invention provides a wall construction which not

only is highly opaque to X-rays, but which also presents a pleasing appearance.

It has been found that a hard barytes ore is not as suitable as a soft amorphous ore, and an ore especially suitable is that found in Washington County, Missouri. This ore contains about 97% barium sulphate. Such an ore when used as a barite sand should preferably be about 12-18 mesh. For the barite powder it is preferable to use a more pure barium sulphate (about 99.75% pure), and the fineness should be about 300 mesh. The cement can be Portland cement of about 200 mesh.

It is obvious that various changes can be made in details without departing from the spirit of this invention; it is, therefore, to be understood that this invention is not to be limited to the specific details described.

Having thus described the invention, what is claimed is:

1. A plaster or concrete for excluding X-rays, containing as its principal ingredient a sand which is opaque to X-rays.

2. A plaster or concrete for excluding X-rays, consisting principally of a mixture of a sand and a powder both of which are opaque to X-rays.

3. A plaster or concrete for excluding X-rays and consisting of a mixture of a sand and a powder both of which are opaque to X-rays, and cement.

4. A plaster or concrete for excluding X-rays containing as its principal ingredient a barite sand.

5. A plaster or concrete for excluding X-rays, consisting principally of a barite sand and a barite powder.

6. A plaster or concrete for excluding X-rays and consisting of a barite sand, a barite powder and cement.

7. A wall covering for excluding X-rays, consisting principally of a cemented mixture of sand and powder both of which are opaque to X-rays.

8. A wall covering for excluding X-rays, consisting principally of a cemented mixture of sand and powder both of which are opaque to X-rays, the proportion of the powder increasing towards the surface of the wall.

In testimony whereof I affix my signature this 26th day of March, 1924.

PHILIP E. HARTH.