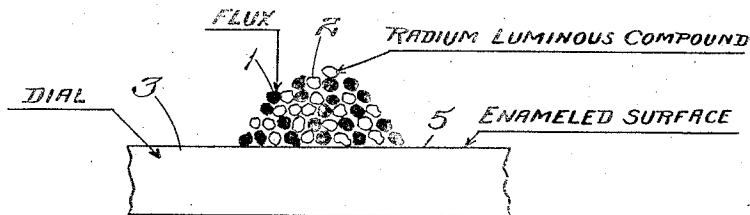
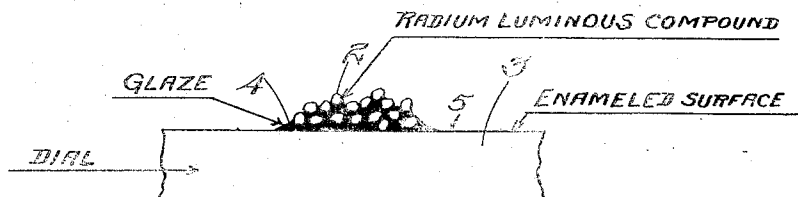


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RADIUM LUMINOUS ARTICLE AND METHOD OF PRODUCING SAME.
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1,304,951.

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RADIUM LUMINOUS ARTICLE AND METHOD OF PRODUCING SAME.

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Specification of Letters Patent.

Patented Jan. 11, 1921.

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To all whom it may concern:

Be it known that I, ELIOT O'HARA, a citizen of the United States, residing at Waltham, county of Middlesex, State of Massachusetts, have invented a certain new and useful Improvement in Radium Luminous Articles and Methods of Producing Same, of which the following is a specification, reference being had therein to the accompanying drawings.

Radium luminous material is applied to particular portions of dials, signs and other articles for the purpose of retaining self-luminous in the dark the particular portions of the article which have been treated with the radium luminous material. The radium compound is usually purchased in the form of a powder. Heretofore the method usually employed to apply the radium luminous compound to the surface of the article has been through the medium of a gum, varnish, glue or other adhesive, which later dries in the same way as any paint or varnish. When it is put on in this old way the luminous coating is not weatherproof or acidproof, and will soil easily, and if the dial is cleaned with alcohol or benzine it will remove the luminous characters. The object of my invention is to provide a new method of applying a radium luminous compound which will retain it weatherproof or acidproof, and will not easily soil, and such that when cleaned with alcohol or benzine it will not remove the luminous characters. Luminosity has longer life as disintegration or breaking up of zinc sulfid crystals is delayed and one object of the invention is to prevent such disintegration.

The invention will be fully understood from the following description when taken in connection with the accompanying drawings, and the novel features will be pointed out and clearly defined in the claims at the close of this specification.

In the drawings, Figure 1 is a view showing in a greatly exaggerated scale the article to be treated with the luminous material, and showing the mixture of radium luminous material and flux applied thereto before being heated.

Fig. 2 shows the same article and compound after it has been heated.

Referring now to the drawings, the article 3 is provided with an enameled surface 5. A flux or glaze represented by the black grains 1, which preferably should contain

no lead is prepared by grinding it to about the same size grain or perhaps finer than the crystals of zinc sulfid powder in the radium compound. I then mix substantially equal proportions of the flux thus prepared and powdered radium luminous compound represented by the white grains 2. In mixing the two ingredients it is important not to grind them but simply to stir them lightly together, because any grinding breaks the crystals of zinc sulfid in the radium luminous compound, and only when the crystals are complete is the best luminosity possible.

One kind of radium luminous compound suitable for such purposes consists of crystallized zinc sulfid mixed in proper proportions with radium bromid; another suitable compound consists of zinc sulfid mixed with mesothorium. A suitable proportion is two parts of radium bromid or mesothorium to ten thousand parts of zinc sulfid, but these proportions may be varied considerably if desired. There are, however, numerous other compounds which may be employed with good results and which contain radio-active and radio-responsive material which will stand the temperature of glazing, and I consider any such compound as coming within the scope of my invention. Any one of certain types of potash-lime glass which is free from lead makes a suitable flux or glaze; such for instance as a glass made according to the following formula: 100 SO_2 , $34 \text{ K}_2\text{CO}_3$, $15 \text{ CaO} \cdot \text{H}_2$, and 33 MnO_2 , or other formulæ given in *Thorpe's Dictionary of Applied Chemistry*, under the caption of Potash lime glass. I do not intend to limit myself, however, to the particular flux above mentioned, or those referred to as there are numerous other leadless fluxes suitable for this purpose. Those above mentioned are merely given as illustrative specimens which are suitable.

While I have said that the proportions of radium compound and the leadless flux or glaze are about half and half I do not limit myself to the use of equal proportions although I consider that the best results are obtained by making the proportions equal.

This mixture of the radium compound and the leadless glaze is then made into a paste by the addition of a little water or volatile oil as preferred, and the paste is then applied to the enameled surface of the dial, sign or other article 3. Then the whole

dial or sign is fired in a muffle furnace at a temperature of from 1000° to 1200° Fahrenheit. The glaze vitrifies and fills up the space between the crystals of radium compound so that each crystal is inclosed in the glaze 4 and the crystals 2 are separated from each other by the intervening glaze, and all the crystals are held solidly in place within the glaze. See Fig. 2. By means of this inclosing glaze, the crystals of radium compound are prevented from disintegrating or splitting apart. Disintegration impairs the luminosity. The glaze is impervious to gasoline and to most acids, and is absolutely weatherproof as well as transparent.

The radium luminous crystals are thus affixed to the dial or other article in a manner that makes them very permanent and prolongs the luminous life.

No gum or other adhesive is required to cause the coating to adhere to the article other than the self-contained adhesive character of the glaze employed.

What I claim is:—

1. The method of applying radium luminous compound to a dial or other article consisting of mixing the radium luminous compound with a flux or glaze, and making the mixture into a paste, then applying the paste to the surface of the article, and then firing the article in a muffle furnace at a very high temperature sufficient to melt the glaze, and then allow it to cool and harden.

2. The method of applying radium luminous compound to a dial or other article having an enameled surface consisting of mixing together powdered radium compound containing crystals of zinc sulfid with a flux or glaze which has been ground to a size as fine as the crystals of the powdered radium compound, stirring this mixture together and forming it into a paste by the addition of a liquid, applying the paste to the por-

tions of the article which are to be rendered luminous and then firing the article in a furnace at a high temperature sufficient to melt the glaze and cause it to surround each crystal of the radium compound, then allowing the article to cool and the glaze to harden.

3. The method of applying radium luminous compound to a dial or other article, consisting of mixing together a powdered radium compound containing crystals of zinc sulfid with a glaze in such manner as to surround the crystals with the glaze, applying the mixture to the portions of the article which are to be rendered luminous, and then vitrifying the mixture upon the article.

4. The method of making a radium luminous article, consisting of mixing together a radium luminous compound containing crystals of zinc sulfid with powdered glaze to form a paste, applying the pasty mixture to the surface of an article which is to be rendered luminous, then firing the mixture at a sufficiently high temperature to melt the glaze and cause it to surround the said crystals of zinc sulfid, and then allowing it to solidify.

5. A dial or other article having radium luminous markings vitrified thereon, consisting of radium luminous compound combined with a glaze thoroughly mixed therewith in such manner that the crystals contained in the radium luminous compound are each surrounded by the glaze, said mixture being vitrified upon the article to which it is attached and secured to the article by the glaze itself.

6. A dial or other article having a radium luminous coating containing zinc sulfid crystals surrounded by a solid transparent glaze.

In testimony whereof I affix my signature.

ELIOT O'HARA.