A. JUNGHANS.

UTILIZING THE LUMINOUS POWER OF RADIOACTIVE COMPOUNDS.

APPLICATION FILED MAR. 1, 1912.

1,173,110. Patented Feb. 22, 1916.

Fig. 1.

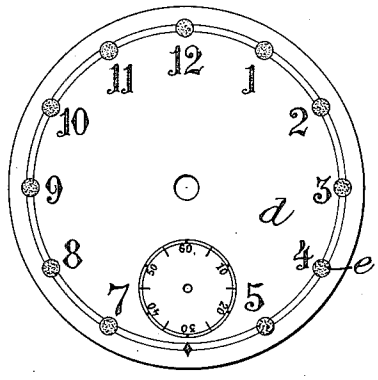


Fig. 2.

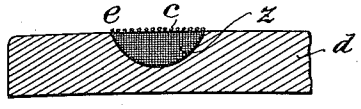
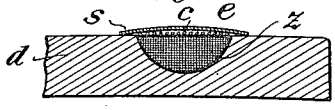


Fig. 3.



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UNITED STATES PATENT OFFICE.

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UTILIZING THE LUMINOUS POWER OF RADIOACTIVE COMPOUNDS.

1,173,110. Specification of Letters Patent. Patented Feb. 22, 1916.

Application filed March 1, 1912. Serial No. 680,891.

To all whom it may concern:

Be it known that I, ARTHUR JUNGHANS, royal privy commercial councillor, a subject of the King of Wurttemberg, residing at Schramberg, in the Kingdom of Wurttemberg, Germany, have invented certain new and useful Improvements in Utilizing the Luminous Power of Radioactive Compounds, of which the following is a full, clear, and exact description.

This invention relates to a new method of utilizing the luminous power of radio-active compounds, which are provided in recesses of the respective objects (such as dials).

It is known that radio-active compounds are very expensive, so that the employment of a good, durable radio-active luminous compound in the wholesale manufacturing industry, such as the clock manufacturing industry is prevented especially by the comparatively high costs. Although only a small quantity of luminous compound is necessary for the single part, namely, the dial indicating member etc. in the case of a rational arrangement, the price of the luminous compound of good quality is nevertheless so high that the manufacture is thereby rendered very expensive and the sale to that extent which would otherwise be possible is precluded. By using only small quantities of radio-active substances, it is obviously possible, to produce a cheaper luminous compound but this article has recently been greatly deteriorated thereby and discredited by the buying public.

The industry and especially the clock making industry are greatly interested in endeavors, which aim at the economical utilization of radio-active substance for their purposes and thereby render the respective articles provided with the luminous compound competitive on the market.

The present new method serves this purpose, as it permits the attainment of the best luminous effect aimed at by using a luminous compound of good quality but of a very small quantity. The method is based on the mode of application, which alone insures a solid and durable attachment, according to which the luminous compound is provided on the indicating members or dials in special hollows, depressions or recesses and is eventually protected by suitable holding means, for example, by cover-plates on dials. The compound is applied in such a manner that a bottom layer of radio-responsive or only lightly radio-active material, such as sulfid of zinc or an inferior luminous compound is first pressed into the respective hollows, depressions or recesses and completely or almost completely fills up the same. This filling layer is then provided with an adhesive substance or the like, on which the radio-active luminous compound is then spread in a finely divided state. The layer of luminous substance thus formed is adapted in spite of its slight thickness to illuminate exactly like a full layer both outwardly and also to react inwardly upon the responsive supporting layer and to cause the latter to also illuminate. Instead of securing the fine layer of strong radio-active luminous compound on the radio-responsive bottom layer by a binding agent, the course may be adopted that the radio-active luminous compound is spread over the bottom layer without using a binding agent and the whole is then secured in its position by a covering plate pasted or otherwise secured thereon.

In applying the invention to dials, the following course should preferably be adopted. The hour figures are provided with recesses, which are first coated with an adhesive substance. The recesses are then filled with sulfid of zinc, the substance being tightly pressed in with a circular-cylindrical rod so that the respective hollow is practically filled up. The surface of this layer of sulfid of zinc is then coated with an adhesive substance, whereupon a very fine layer of the radio-active luminous compound is spread over the said layer of adhesive substance. The radio-active bodies are of course effective in all directions and even if the surface of the layer of sulfid of zinc is not completely covered with the radio-active compound, the protruding radio-active granules nevertheless radiate to the sides and cause the sulfid of zinc to illuminate, so that a larger surface of the radio-active compound is rendered effective than if the whole surface were completely covered. Consequently, a considerable saving of radio-active substance can be effected, the advantage being also attained that the reduced quantity is less detrimental to the glass and other parts of the clock than the large quantity which is usually required.

In the drawings wherein I have illustrated

the invention,—Figure 1 is a face view of a dial having a series of luminous fields. Fig. 2 is a cross-sectional view through one of the fields in Fig. 1, considerably enlarged. Fig. 3 is a similar view showing the use of a retaining plate.

In the drawings *d* indicates a dial having a series of luminous fields *e*, *z* the radio-responsive or slightly radio-active material, and *c* the layer of radio-active material. In Fig. 2 the latter is illustrated as being held in place by an adhesive. In Fig. 3 it is illustrated as held in place by a covering plate *s* of transparent or translucent material.

What I claim as my invention and desire to secure by Letters Patent is:

1. A device for utilizing the luminous power of radio-active compounds, comprising a body having recesses therein a bottom layer of radio-responsive or slightly radio-active material pressed in said recesses, which substantially fills up the said recesses, an adhesive substance or the like on said layer, and a thin layer of radio-active luminous compound in a finely divided state on this adhering intermediate layer, so that the layer of luminous substance thus formed is adapted in spite of its slight thickness to illuminate outwardly like a full layer and also to act inwardly upon the responsive supporting layer and to cause the latter to also illuminate, substantially as described and for the purpose set forth.

2. A device for utilizing the luminous power of radio-active compounds, comprising a body having recesses therein a bottom layer of radio-responsive or slightly radio-active material pressed in said recesses, which substantially fills up the said recesses, a thin layer of radio-active material in a finely divided state on said layer of radio-responsive material, and means for securing the layers of radio-responsive and radio-active material in position, substantially as described and for the purpose set forth.

3. A device for utilizing the luminous power of radio-active compounds in producing luminous effects, comprising a thin layer of radio-active material and a base of radio-responsive material beneath said layer of radio-active material, and a layer of adhesive between said layers of radio-active and radio-responsive material.

4. A device for utilizing the luminous power of radio-active compounds in producing luminous effects, comprising a base-layer of radio-responsive material in an inclosure having an opening therein, a thin layer of radio-active material on said base layer, and a light-transmitting material for securing said layers in place.

5. A device for utilizing the luminous power of radio-active compounds in producing luminous effects, comprising a base-layer of radio-responsive material in an inclosure having an opening therein, a thin layer of radio-active material on said base layer, and an adhesive between said radio-active and radio-responsive material.

6. A device for utilizing the luminous power of radio-active compounds in producing luminous effects, comprising a body having a recess therein a base-layer of radio-responsive material in said recess, said recess being coated with an adhesive prior to placing said base-layer of radio-responsive material therein, a thin layer of radio-active material on said base-layer, and said radio-active material being secured in place by means of a light-transmitting material.

7. A device for utilizing the luminous power of radio-active compounds in producing luminous effects, comprising a body having a recess therein a base-layer of radio-responsive material in said recess, said recess being coated with an adhesive prior to placing said base-layer of radio-responsive material therein, a thin layer of radio-active material on said base-layer, and an adhesive between said radio-active and said radio-responsive materials.

8. A body having a mass of radio-responsive material, and a thin surface coating of finely divided radio-active material thereon.

9. A body having a recess substantially filled with radio-responsive material and a thin surface coating of radio-active material thereon.

10. A body having a mass of radio-responsive material, a thin surface coating of finely divided radio-active material thereon, and means for retaining said coating in place.

In witness whereof, I have hereunto signed my name in the presence of two subscribing witnesses.

ARTHUR JUNGHANS.

Witnesses:
ERNEST ENTENMANN,
FRIDA KLAIBER.