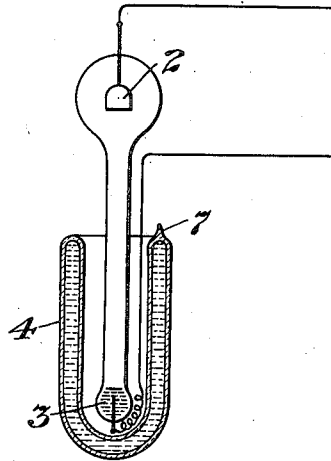


P. C. HEWITT.  
 LIGHT TRANSFORMING COMPOSITION.  
 APPLICATION FILED OCT. 20, 1913.

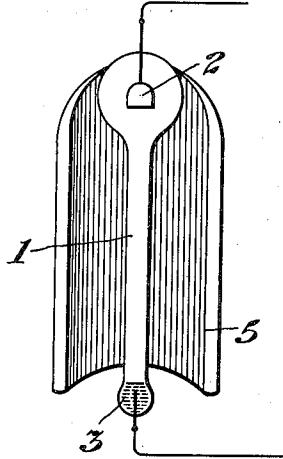
1,110,563.

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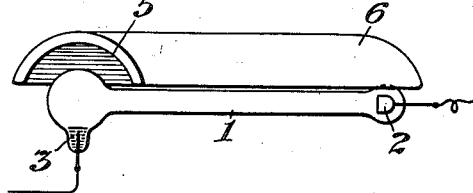
*Fig. 1*



*Fig. 2*



*Fig. 3*



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# UNITED STATES PATENT OFFICE.

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## LIGHT-TRANSFORMING COMPOSITION.

1,110,563.

Specification of Letters Patent.

Patented Sept. 15, 1914.

Original application filed April 3, 1901, Serial No. 54,179. Divided and application filed September 15, 1908, Serial No. 453,187. Divided and this application filed October 20, 1913. Serial No. 796,189.

*To all whom it may concern:*

Be it known that I, PETER COOPER HEWITT, a citizen of the United States, and resident of Ringwood Manor, county of Passaic, State of New Jersey, have invented certain new and useful Improvements in Light-Transforming Composition, of which the following is a specification.

The present invention relates to means for combining with the rays of a source of light which is deficient in some desired portion of the spectrum other rays produced by the transformation of certain of the waves of the defective source into luminous waves of such a character as to supply the defects of the original source of light.

I am aware that it is known among those skilled in the art that certain materials have the property of transforming energy of certain wave lengths into energy of other wave lengths, and I do not claim broadly to have discovered this quality. Certain of such materials have been recognized and called fluorescent materials.

It is, however, the object of my invention to make use of this property of such bodies to render useful a source of energy which is deficient in certain wave lengths and more particularly with respect to certain sources of illumination which are defective in certain colors, correcting this difficulty and rendering them useful. It is found in many cases that a comparatively small addition of energy from the original source is sufficient to effect the desired result. I propose to gain this addition of the desired wave lengths by subjecting a portion of the energy from the original source to the action of such suitable substances in a manner that the wave lengths emitted from the material shall be mingled with those from the original source for useful purposes. For example, I may develop in a vapor such as mercury vapor an intense illumination by passing electric current through the vapor and may then supply the red rays which are naturally lacking in a source of light thus created by the action of materials adapted to transform some of the rays derived from this source into such wave lengths as are adapted to give to the light

as a whole the lacking qualities so as to produce a light in which the natural defects of the original source of light do not appear.

As illustrative of this invention, the light produced by the action of electric currents on the vapor of mercury as described for instance in certain patents issued to me September 17, 1901, produces a light which is deficient in red rays but strong in yellow and green, also blue and violet. By the use of Magdala red in alcoholic solution, both on reflection and on transmission, red rays appear in the spectrum of light created from mercury vapor. These red rays may be derived from other bands but appears from the resulting spectrum as if the greenish-yellow ray is the ray chiefly converted into red. Eosin in alcoholic solution has the property of bringing into existence yellow and green rays from some other band. Sulfate of quinin in water solution brings into existence blue rays.

By the use of different materials any rays may be brought into existence. These materials, however, must be in the proper physical condition in order to possess this property whether in solution, mixture or in their natural state.

Rhodamin in alcoholic solution has the property of bringing out red rays in quantity from light having as its source mercury vapor, but when in solution in water it seems to possess this property only slightly, if at all. Where it is to be used as a paint, it possesses the desired quality when held by fish-blue as a binder and also by starch; but when held by ordinary glue of commerce as a binder it seems to lose this property. In gum-arabic or mastic it possesses this property to hardly an appreciable extent. It appears as if the particular physical arrangement of the material itself by reason of its mixture with some other material causes it to have this property and when it is not in this particular physical condition, the property is absent. Certain mordants, which may be used as a carrier for the color in dyeing, cause it to have this property of transforming light so that in the case of each particular material, a material which

will cause the substance used to give this property must be associated with it in order to render it an effective agent, except where the agent possesses the property itself by reason of some special condition. Two or more materials which, individually, do not have the required property, may be mixed together and such mixture may possess it.

In cases where it is desirable to use glass as the carrier, on account of its natural properties, certain metallic salts may be dissolved therein or mixed with it so as to produce this quality of transforming the rays of light. Recognition of the value of this property as a reflector for commercial use for transforming one ray of light into a ray of another color and also as a screen whereby the rays of light are allowed to pass through the screen undergoing transformation in their passage instead of screening back certain fixed rays as is the ordinary practice in shades and the mingling of the resultant rays, I believe to be new with me.

In practice, I have obtained excellent results by placing back of a mercury vapor lamp a reflector consisting of any suitable surface, such for instance, as tin coated with rhodamin dissolved in fish-glue; also by surrounding such a lamp wholly or in part by a glass vessel containing an alcoholic solution of rhodamin. Our methods of combining the transformed rays with the untransformed rays either by these or other paints or solution will be evident from the description.

It will be seen that my invention contemplates, among other things, the transforming of rays of light of one color from a given source into rays of light of another color in the same source and mingling the modified or transformed rays with the other rays. The result of this process is a light which combines the normal and the modified or transformed rays. To illustrate my invention, I show three figures of drawings, Figure 1 representing a mercury vapor lamp surrounded by a vessel containing fluorescent material, and Figs. 2 and 3 representing a similar lamp combined with suitable reflectors.

In the drawings, 1 is a mercury vapor lamp having electrodes 2 and 3, the latter of

which is of mercury. The electrode 2 may be of iron or other suitable material.

The novelty of the particular apparatus shown in Fig. 1 resides in providing around all or a portion of the lamp a vessel, as 4, containing a fluorescent material. This may be, for example, an alcoholic solution of rhodamin. The details may be varied in accordance with the foregoing description or within limits suggested thereby.

Fig. 2 shows a vertical lamp similar to that illustrated in Fig. 1, the same having placed behind it a reflector 5. This reflector may be of tin or other suitable material having an inner surface of fish glue combined with rhodamin or other suitable material. These materials are, as before, simply noted as examples.

Fig. 3 shows a similar construction, the lamp in this instance, however, being horizontal and the reflector so arranged as to throw the reflected and the transformed rays downward to mingle with the direct rays from the source.

The back of the reflector 6 should be of such material as to reflect the light through the fluorescent material on its face, whether this be a liquid or be of the nature of a varnish glaze.

In Fig. 1 where a liquid is held in a glass container I show a means, 7, for providing a mouth to fill and replenish the reflector which also serves as an expansion outlet.

The present application is a division of my application Serial Number 453,187, filed September 15th, 1908.

I claim as my invention:

1. A light transforming material comprising a solution of rhodamin carried in a body of fish glue.

2. A light transforming material constituted by a fluorescent dye carried in a body of fish glue.

Signed at New York, in the county of New York, and State of New York, this 16th day of October, A. D. 1913.

PETER COOPER HEWITT.

Witnesses:

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