No. 764,622. PATENTED JULY 12, 1904.

A. E. OUTERBRIDGE, Jr.

TRANSLUCENT COLOR COMPARATOR OR COLOR SCREEN.

APPLICATION FILED FEB. 14, 1902.

NO MODEL.

Fig. 1.

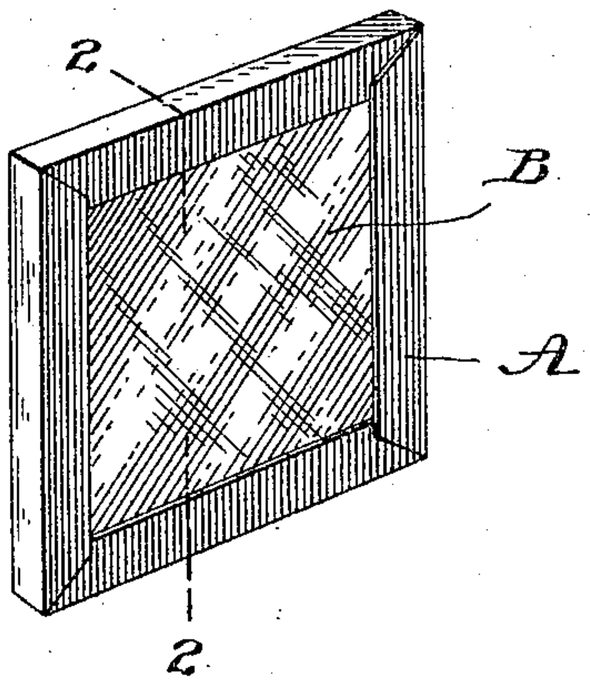


Fig. 2.

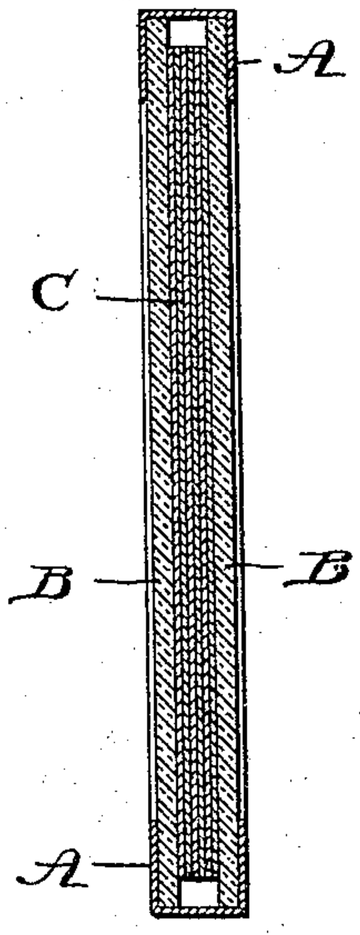


Fig. 3.

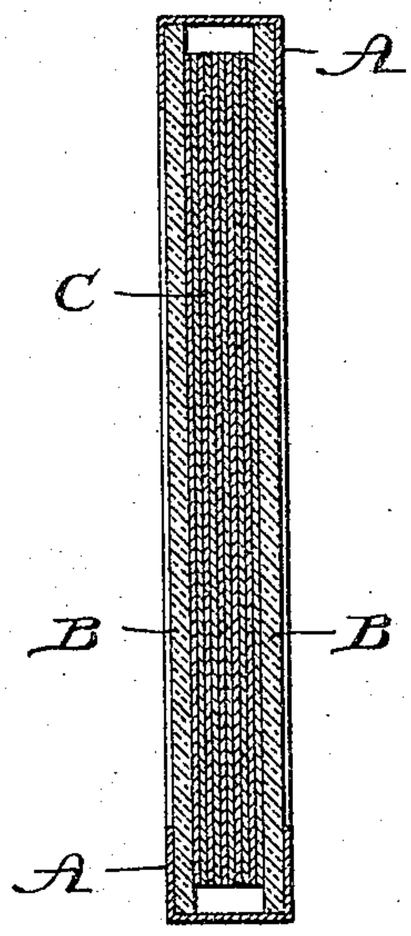
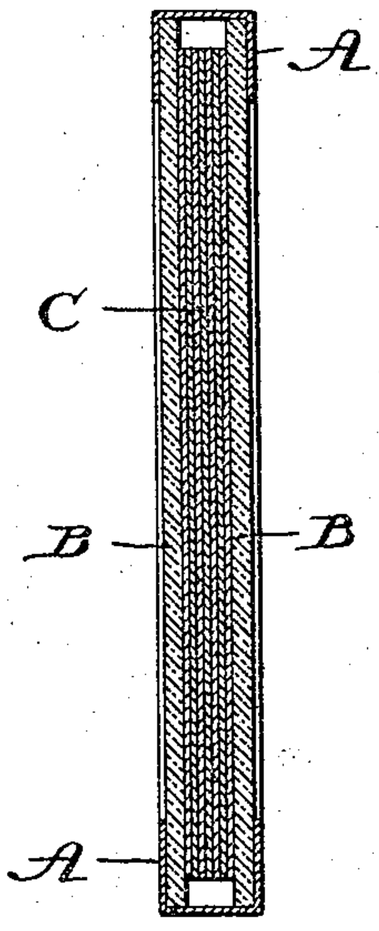


Fig. 4.



WITNESSES:

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UNITED STATES PATENT OFFICE.

ALEXANDER E. OUTERBRIDGE, JR., OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO WILLIAM SELLERS AND COMPANY, INCORPORATED, A CORPORATION OF PENNSYLVANIA.

TRANSLUCENT COLOR-COMPARATOR OR COLOR-SCREEN.

SPECIFICATION forming part of Letters Patent No. 764,622, dated July 12, 1904.

Application filed February 14, 1902. Serial No. 94,024. (No model.)

To all whom it may concern:

Be it known that I, ALEXANDER E. OUTERBRIDGE, Jr., a citizen of the United States, residing at Philadelphia, county of Philadelphia, and State of Pennsylvania, have invented a new and useful Improvement in Translucent Color-Comparators or Color-Screens, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates to a new and improved translucent color-comparator or color-screen designed to afford a rapid means of ascertaining the temperature of a bath of molten metal or an incandescent metallic or non-metallic body by comparing the color and luminosity of rays of light emanating from the heated object with the color and luminosity of the color-comparator or color-screen illuminated with a white light of measured intensity, such color-comparator or color-screen being made to clearly simulate the color and luminosity of a bath of molten metal or of an incandescent solid substance heated to a known temperature. Liquid color comparators or screens have been used for a similar purpose. These liquid screens were made by forming a solution containing different materials to form color-screens, having proper colors and luminosity for the different temperatures of the molten metal or incandescent solid substance. Such liquid color-screens are difficult to form correctly, and the liquids are subject to rapid deterioration, owing to the changes that occur in color, density, and transparency of the solutions, so that they soon lose their value as color-comparators or standards of heat measurement. Such color-comparators are also difficult to standardize or handle. Moreover, the quality and color of the glass vessels which contain the liquid differ materially, so that it is extremely difficult, if not impossible, to reproduce a screen except by comparison with a standard which we have shown cannot be maintained.

I have discovered that I can form a comparator from solid translucent media by which the temperature of a molten bath or incandescent object can be determined, and thus obviate the difficulties and troubles of the present liquid comparators used for this purpose. The means by which I accomplish this result are as follows: I combine together translucent colored solid media and other solid translucent media which produce a neutral tint, so that when the comparator thus formed is exposed to a standard light it will correspond in color and luminosity to that of the molten bath or incandescent object. This comparator may be formed in two ways. I may use solid translucent colored media of primary colors of approximately pure tints, or I can employ a great variety of different-colored films or colored media without regard to their purity of tint. In the first case I construct my comparator in the following manner: I combine together translucent colored solid media to form a color which when exposed to a standard light will correspond to that of the molten bath or incandescent object. I then combine with the aforesaid translucent solid media other translucent solid media which will produce neutral tints, thus varying the luminosity without affecting the color to bring the comparator to the required luminosity to correspond to that of the molten bath or incandescent object. I thus form a permanent solid comparator which can be readily duplicated. As the translucent solid media I prefer to use a non-crystalline material, such as gelatin, celluloid, or the like.

In the drawings, Figure 1 is a perspective view of a comparator. Figure 2 is an enlarged section on line 2 2, Fig. 1. Fig. 3 is a section similar to Fig. 2 of a modified form of comparator. Fig. 4 is a section similar to Fig. 2 of another modified form of comparator.

I will now describe the manner I form my improved comparator where the colored media used are primary colors of approximately pure tints. The temperature of the molten bath or incandescent body is first obtained by a pyrometer in the usual way. The color and luminosity of the visible rays emanating from the heated body having been carefully observed, the colored films are combined in such colors

as to correspond to the color of the object when said films are placed between the eye and a fixed source of light. I then add films which produce neutral tints until the comparator corresponds to the luminosity of the object. Having thus formed a standard comparator for any given object, the same may be readily duplicated and being placed and secured between glass plates will be readily transportable and usable. I prefer to use films of non-crystalline material, such as gelatin and celluloid, as this material may be readily obtained of substantially uniform colors. For colors I prefer to use red, green, and yellow, although other colors may be used. I also prefer to use colored films as the media for forming the neutral tints—that is, absorption of light—without change of color; but the same effect may be obtained from the use of smoky glass or films.

I will now describe the specific comparator illustrated in Figs. 1 and 2 of the accompanying drawings. This comparator corresponds to the temperature of an incandescent object at 1,160° Fahrenheit. The series of colored films C are six in number—three red, one yellow, one pink, and one green—interposed between two plates of colorless glass B. In forming this comparator the red and yellow films are those which are combined to produce or match the color of the glowing object, and the green and pink are added to produce a neutral tint to provide for the proper absorption of light from the standard white light, so as to make the comparator correspond to the luminosity of the object without changing its color. As stated before, while I prefer to use colored films to produce the neutral tint smoky films or glasses can be used. The glass plates, with the interposed films, are bound or secured together by means of the frame A, formed of metal or paper strips. To produce a comparator corresponding to any other temperature, the same operation is employed. The colored films are combined until when interposed between the eye and a standard white light they will correspond in color with the molten object, and then media which will produce neutral tints are added until the luminosity corresponds to the luminosity of the molten object. Having made a series of these comparators for different temperatures, they at once become standards and can be duplicated at will.

I have now described a method of preparing standard color and luminosity comparators or screens made from solid translucent colored media of primary colors and of approximately pure tints. In the case previously mentioned, where I intend to form my color and luminosity comparator from different-colored films or colored media without regard to their purity of tint, I form such comparators, speaking generally, in the same way that I form the comparators where pure tints are used, the difference being that the films or media which I use to produce neutral tints, so as to regulate the luminosity, I also use for the purpose of neutralizing the impurity of color in the other films. In Figs. 3 and 4 I have shown two color-comparators which are the same in color and transparency when viewed by transmitted light. These comparators correspond to the color and luminosity of a bath of molten metal or incandescent object heated to about 1,000° Fahrenheit. The films C in Fig. 3 are composed of seven reddish films, one pinkish film, and two greenish films placed between two glass plates B. In Fig. 4 the films C comprise six orange-yellowish films and one bluish film placed between glass plates B. When these two comparators are viewed side by side by transmitted light, they correspond to each other in color and in luminosity. Both present to the eye the appearance of dark-red glass without any visible evidence of the presence of green in the one or of blue in the other. In the comparator shown in Fig. 3 the reddish and pinkish films are the films I rely upon to obtain the color. The greenish films are the films which I rely upon to bring the transparency or luminosity to the proper degree and also to neutralize any improper coloring in the remaining films. The same is true with reference to the bluish film in the comparator of Fig. 4. Thus in the comparator of Fig. 4 the greenish films neutralize the excess of red and yellow existing in the impure red film, while the bluish film in the comparator of Fig. 4 neutralizes the excess of yellow and red in the impure-yellow or orange-yellow films forming this screen. The resultant effect to the eye, both as to color and luminosity, of the two screens so differently composed is practically the same when they are viewed by transmitted light. As previously stated in the specification, where pure primary colors are used the neutral tint by which luminosity is obtained may be produced by the use of smoked glass or films of gelatin or other transparent non-crystalline media darkened with a neutral tint, such as may be imparted by a solution of "anilin-black" or other black dye substance; but in practice I prefer to use colors, as previously described. My invention has this novel feature, that there is produced a solid translucent color or luminosity comparator which when viewed by transmitted light of definite intensity counterfeits the appearance, both as to color and luminosity, of a bath of molten metal or an incandescent object heated to any particular temperature, thus in effect making a permanent temperature register or scale, by means of which a workman is enabled to bring the temperature of a bath of molten metal or incandescent object to a known temperature and maintain the bath or heated object at the desired temperature for an indefinite time without difficulty. With the use of my comparator in practice it has

been found easy for workmen to maintain these high temperatures (ranging ordinarily between 800° Fahrenheit to 2,000° Fahrenheit) within 10° Fahrenheit of the required temperature, which has been proved by checks made by pyrometers of well-known accuracy.

Having now fully described my invention, what I claim, and desire to protect by Letters Patent, is—

A color-comparator or color-screen, composed of a plurality of superposed translucent non-crystalline colored films supported between translucent plates, in combination with means to hold said plates and films in permanent relation to each other.

In testimony of which invention I have hereunto set my hand, at Philadelphia, on this 11th day of February, 1902.

ALEXANDER E. OUTERBRIDGE, JR.

Witnesses:

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M. M. HAMILTON.