

Feb. 18, 1930.

A. J. CAWLEY

1,747,425

PROJECTION SCREEN

Filed Feb. 21, 1922

Fig. 1.

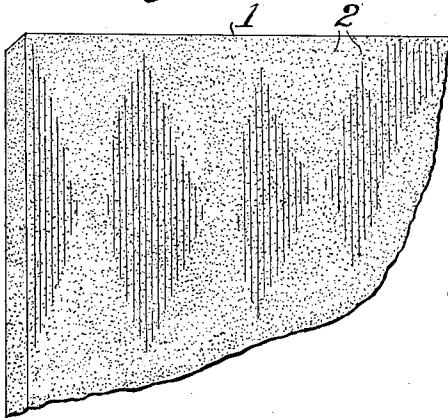


Fig. 2.

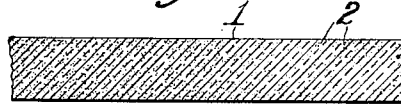


Fig. 3.

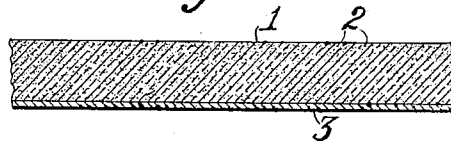


Fig. 4.

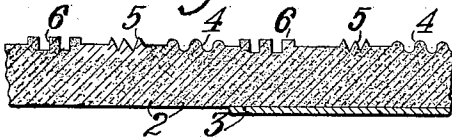


Fig. 5.

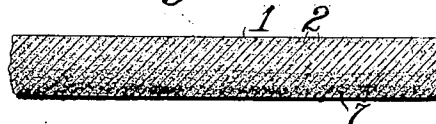


Fig. 6.

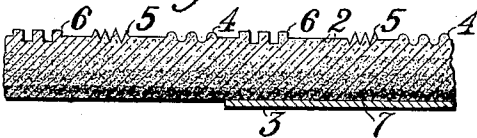


Fig. 7.

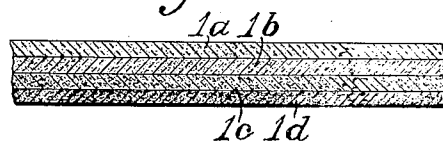


Fig. 8.

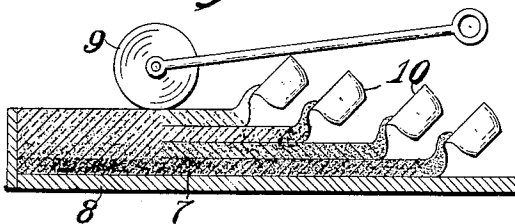
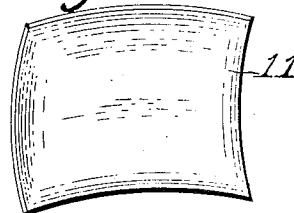


Fig. 9.



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PROJECTION SCREEN

Application filed February 21, 1922. Serial No. 538,339.

The invention relates generally to the production of pictures that have a life-like appearance by reflecting not so much from the surfaces of the screen, but throughout its entire thickness. More particularly it concerns a screen body in which a reflecting material has been incorporated in slight amount. This is the equivalent of a screen body that is virtually a whole series of reflecting planes placed one behind the other. As light representing different objects is reflected from the intermediate thickness of the film, the brain and associated optical nerve and reflex arcs has an opportunity of associating a certain object at a certain part of the background with the light representing this object which is being reflected from an intermediate part of the screen body.

This screen will have a certain capacity to produce a daylight effect, due to the fact that light coming from the sides of the theatre will not have the same opportunity of being all reflected back to the audience. Also a certain amount of tinting as herein described may be applied to the screen to further aid this daylight effect.

Reference is to be had to the accompanying drawing forming a part of the specification, in which like characters of reference denote corresponding parts in all the views, and in which,

Figure 1 is a view of a screen having reflecting material incorporated in it.

Figure 2 is a cross-sectional view of the screen shown in Figure 1.

Figure 3 is a cross-sectional view of a screen similar to the above and having a reflecting surface at the rear.

Figure 4 is a cross-sectional view of a similar screen to the above and having a ridged reflecting surface.

Figure 5 is a cross-sectional view of a screen in which the particles are disposed in varying densities, instead of being uniformly distributed.

Figure 6 is a cross-sectional view of a screen in which the particles are disposed in varying densities and having a ridged surface and a light reflecting backing.

Figure 7 is a cross-sectional view of a

screen made up of several layers, each layer having a different density of light reflecting material.

Figure 8 shows a method of making the type of screen under consideration.

Figure 9 is an elevational view of the form in which the screen is arranged.

The body of the screen may be made of glass or any other suitable transparent material. Such a screen is shown in Figures 1 and 2. The transparent body is represented by 1 and the light reflecting material which is disposed throughout its extent is indicated by 2. The invention includes any concentration of reflecting material. It may be incorporated so as to produce the faintest mistiness, or it may be that approaching the dense translucency of a thin sheet of marble. It also comprises any size, or aggregation of particles, from that of the red tint produced by the addition of gold to glass in extremely slight amounts, to the chalkiness of milk glass, or may consist entirely of metallic particles embedded in the glass. This latter would have an advantage in producing daylight pictures, particularly when such metal as aluminum, silver, aluminum bronze, etc., is used.

To produce total reflection, a silver or other reflecting surface may be placed at the back of the body of the screen as shown in Figure 3. This differs from the well-known mirror screen in having the equivalent of a multiplicity of reflecting surfaces one disposed behind the other throughout its entire thickness, and is thus capable of producing a stereoscopic effect. Instead of having all or nearly all of the reflection taking place at the surface of the screen, no reflection is to be obtained there in the present invention. The object is to obtain as much as possible reflection in the intermediate thickness of the screen. However, it may be impossible to have all of the reflection here, and the surface 3 is provided to reflect whatever is left over. But it is desired to avoid reflection completely at the surface adjacent the projector.

Figure 4 shows a screen provided with ridges, corrugations and cubes 6 for the pur-

pose of breaking up surface reflection and for the purpose of aiding in producing a stereoscopic effect. This screen may be provided with a reflecting surface 3 at the rear, if desired. The corrugations are shown at 4, the ribs at 5 and the cubes at 6.

All of the screens so far described have had the light reflecting substance 2 uniformly disposed throughout the thickness. Figure 5 shows this material disposed in ever increasing concentration from front to back, the greatest concentration being at 7 immediately adjacent rear surface. A concentration may be provided at 7 sufficient to produce total reflection of all of the light remaining.

Figure 6 shows a screen body similar to that in the previous figure, and having its front surface provided with corrugations 4, ridges 5, or cubes 6. In addition, it may or may not have a reflecting surface 3.

Figure 7 illustrates a screen made up of several layers which may be cemented together. Each layer from front to rear, contains a different concentration of light reflecting material. Layer 1^a has an extremely slight amount, while 1^b has more, 1^c still more, and finally 1^d has the greatest amount of all.

Figure 8 shows a method of making the types of screens shown in Figure 6. The table 8 is the usual one upon which the glass is poured. The crucibles shown at 10 each contain a solution of glass having a certain definite concentration of the reflecting material. The crucible having the densest solution is poured on first, forming layer 7, and the others in decreasing density are poured on in that order. Roller 9 makes a homogeneous whole of the mass before it cools. The surfaces may then be polished.

Figure 9 represents the preferred form of the screens. The screen is shown as a section of a hollow sphere as shown at 11. This form is old in the art and is not claimed. However, this form is known to have advantages in producing stereoscopic effects. The ridged, corrugated or cubed surface also is known to have a certain influence in producing a stereoscopic effect, and is not claimed in that capacity. It is also used here to break up surface reflection. The invention combines the effect of the body provided with reflecting particles, the corrugated or ridged surface and the spherical form, all tending to produce stereoscopic effects.

By increasing the density of the light reflecting material in Figure 1, a milk glass can be produced. Moreover such a screen may be used from either side as a viewing surface. For instance, the projector may be behind the screen with respect to the audience.

All of the projector light will reach the reflecting particles and be diffusely reflected

to the audience, and thus give excellent projection qualities. Light coming from the sides of the theatre, particularly with the smooth faced screen will not have the same advantage in reaching the diffusing material in the interior of the screen, and will not be thus as diffusely reflected. Furthermore it is known that screens which have been slightly tinted red, etc., have "daylight" properties. Such coloring matter may be used as is desired throughout the screen either alone or with other reflecting powder, or metallic particles, to aid in producing daylight projection.

Although particles are indicated by dots in the drawing, it is to be understood that the invention comprises everything from actual visible particles to an imperceptible blending forming a homogeneous whole. The screen may have the faintest milkiness, or the faintest colored hue if desired.

The different layers of the screen shown in Figure 7 need not be placed in actual contact, as a space or spaces may be interposed.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. A projection screen consisting of a transparent body containing light reflecting material disposed in increasing density, the densest portion being adjacent one surface and there being a gradual and progressive decreased disposition of said material towards the opposite surface.

2. A projection screen consisting of a transparent body containing light reflecting material throughout, a surface-reflection breaking means on one surface and a reflecting surface on the other.

3. A projection screen consisting of a transparent body containing light reflecting material disposed in increasing density, the greatest density being adjacent the rear surface, there being a gradual decrease in density towards the front of said screen and an indented surface to break up surface reflection.

4. A projection screen consisting of a transparent body containing light reflecting material disposed in increasing density, the greatest density being adjacent the rear surface, there being a gradual decrease in density towards the front of said screen and a reflecting surface at rear of said body and an indented surface at the front thereof to break surface reflection.

5. A projection screen consisting of a transparent body made up of several layers, each layer containing light reflecting substance containing a different concentration of the said light reflecting substance, the densest layer being placed at the rear of screen, and the remaining layers being disposed in the order of their decreased concentrations.

6. A projection screen consisting of a plu-

5 rality of layers of a transparent medium,
each of said layers having a different con-
centration of reflecting material, the layer
having the greatest concentration of reflect-
ing material being placed at the rear and the
remaining layers being arranged in the order
of decreased density towards the front, and
a reflecting layer at rear of said screen.

10 7. A projection screen, consisting of a glass
body in whose substance has been impreg-
nated light reflecting particles.

Pittston, Pa., September 20th, 1921.

ALOYSIUS J. CAWLEY.

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