

Feb. 24, 1942.

S. FREED

2,274,444

LIGHTING FIXTURE

Filed May 4, 1940

Fig. 1

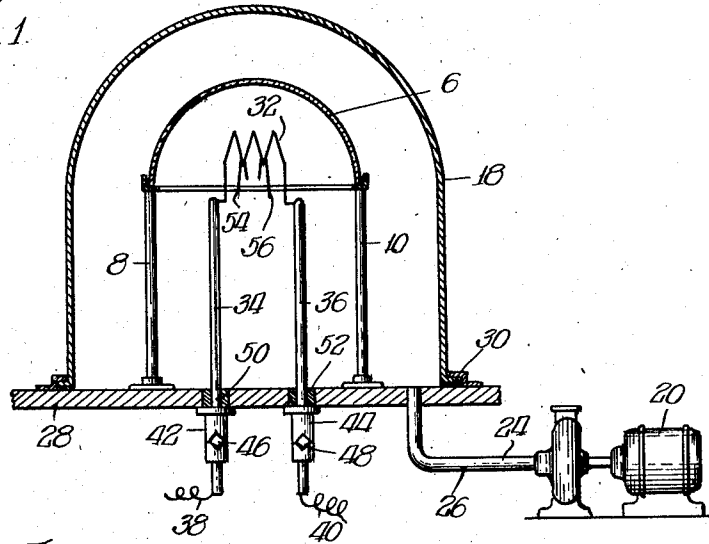


Fig. 2

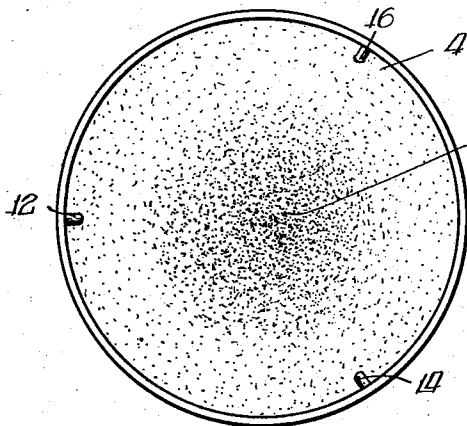


Fig. 3

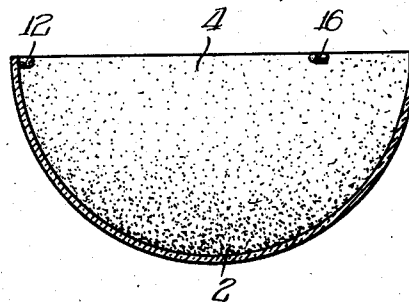
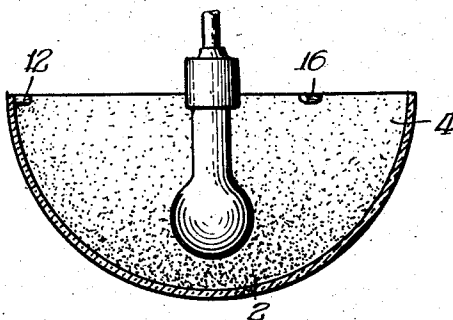


Fig. 4



INVENTOR.
Simon Freed
BY *Richard Spencer*
attor.

UNITED STATES PATENT OFFICE

2,274,444

LIGHTING FIXTURE

Simon Freed, Chicago, Ill.

Application May 4, 1940, Serial No. 333,329

2 Claims. (Cl. 240—78)

This invention relates to a new and improved type of lighting fixture, more particularly a lighting fixture for the distribution of illumination which permits a portion of the light to be transmitted and a portion reflected.

One of the objects of the invention is to provide a new and improved method for distributing the illumination by means of lighting fixtures whereby the relative amount of light transmitted and reflected may be varied.

Another object of the invention is to provide a new and improved type of lighting fixture for distributing the illumination of lamps whereby the distribution of reflected and transmitted light may be varied in uniform gradations, according to the lighting requirements, such as to obtain maximum uniform illumination with the minimum amount of glare. Other objects will appear hereinafter.

In accordance with the invention, it has been found that new and improved effects in lighting fixtures may be obtained which will bring about variability in reflection and transmission by depositing films of substances possessing metallic reflection on transparent or translucent glass or plastic forms. The surface on which the films may be deposited may be either curved surfaces or plane surfaces. It is essential, however, that the film be thin enough to allow a portion of the light to be transmitted. The invention is particularly applicable to lighting fixtures or lamp shades having a curved surface. In making such fixtures in accordance with the invention it is preferable to apply the film in varying thicknesses of uniform gradation, as will be hereinafter more fully explained. As an example of fixtures to which the invention may be applied there may be mentioned glass bowls or shades which may be clear, opal, prismatic or frosted and either colorless or colored. For the purpose of the present invention it is preferable to employ metallic aluminum as the film forming substance.

Other features and advantages of the invention will be apparent by reference to the following description in conjunction with the accompanying drawing, in which:

Figure 1 represents a cross-section of an apparatus for applying a metallic film forming substance to a lighting fixture in accordance with this invention;

Figure 2 represents a plan view of a preferred type of lighting fixture or lamp shade made in accordance with this invention;

Figure 3 is a cross-section of the lighting fixture shown in Figure 2; and

Figure 4 illustrates the use of a lighting fixture of the character herein described in conjunction with a source of illumination such as an electric light, incandescent bulb or the like.

In the lighting fixture shown in Figures 2 and 3, the particular embodiment illustrated comprises a glass fixture in the shape of a bowl having a film of aluminum formed on the interior surface thereof, this film being thicker and hence transmitting less light at the bottom of the bowl than elsewhere and the thickness of the film diminishing along the interior surface of the bowl from the bottom toward the rim. In this way the amount of reflected light relative to the amount of transmitted light may be varied as the light comes through the fixture at different angles. Such a fixture is particularly suitable for use as a ceiling fixture because the particular construction described tends to avoid the glare caused by too much light coming directly through the bottom of the fixture. At the same time the gradually increasing amount of light transmission from the bottom toward the rim of the fixture tends to diffuse and spread the illumination evenly over a given area. In addition there is a substantial amount of light reflected toward the ceiling from all parts of the interior surface of the fixture.

In Figure 2 the greatest thickness of the metallic aluminum film is at the bottom of the fixture shown by numeral 2, while the least thickness is adjacent the rim, as shown by numeral 4. In between the bottom of the fixture and the rim, as previously explained, there is a gradually diminishing thickness of film. The film at the bottom point 2, although reflecting a major proportion of the light, still permits some transmission, whereas the film adjacent the rim area 4 reflects a minor proportion of the light and transmits a major proportion.

The method of applying a metallic reflecting surface to the interior of a light fixture may be accomplished as shown in Figure 1. In Figure 1 the fixture 6 is supported on supports 8 and 10 from projections 12, 14 and 16, as shown in Figure 2. If desired, these projections may later be removed from the fixture. Supports 8 and 10 may also be made adjustable in order to permit raising or lowering of the fixture.

The fixture mounted upon its supports 8 and 10 is placed within a bell jar 18 or other suitable type of apparatus from which the air may be exhausted by means of a pump 20 connected to

the interior 22 of the bell jar 18 through a conduit 24 controlled by a valve 26. It will be understood that the bell jar 18 is supported on a plane surface 28 and that air is prevented from entering the interior 22 of bell jar 18 by means of a seal 30 extending around the bell jar at its juncture with surface 28.

A tungsten filament 32 is mounted within the bell jar 18 from electrodes 34 and 36 and a source of electrical energy is supplied through conductors 38 and 40, respectively. Electrodes 34 and 36 are held in clamps 42 and 44, respectively, which are provided with set screws 46 and 48. It will thus be apparent that by adjustment of the set screws 46 and 48 the electrodes 34 and 36 may be raised and lowered. Each electrode is sealed by means of seals 50 and 52 in order to prevent the ingress of air into the space 22.

A source of aluminum is provided by fine aluminum wires 54 and 56 which are suspended on tungsten filament 32, as shown in Figure 1.

When pump 20 is started and valve 26 is opened, the air is exhausted from the bell jar 18 creating substantially a vacuum therein. The wires 38 and 40 are connected to a source of electrical energy causing the tungsten filament 32 to become very hot. The heat thus generated in the presence of the vacuum causes the aluminum to vaporize and deposit upon the interior surface of the fixture 6 in approximate proportions of the nearness of the surface to the source of emanation of aluminum vapors. Thus, by disposing the interior surface with the bottom of the fixture closer to the filaments 54 and 56 than the rim, it is possible to deposit a thicker film of aluminum at the bottom of the fixture and to cause a gradation in the thickness of the film gradually diminishing from the bottom toward the rim.

Although aluminum is preferred for the purpose of the invention, it will be understood that the invention is not limited to the use of aluminum. The metals which may be used singly or severally are aluminum, silver, chromium, magnesium, beryllium, silicon, scandium, titanium, vanadium, manganese, iron, cobalt, nickel, copper, zinc, gallium, germanium, arsenic, yttrium, zirconium, niobium, molybdenum, ruthenium, palladium, cadmium, indium, tin, lead, the rare earth metals, hafnium, tantalum, tungsten, rhenium, osmium, iridium, platinum, gold, mercury, thallium, thorium, uranium, antimony, tellurium, bismuth. Also inorganic and organic substances possessing metallic reflection may be used. These films may be modified by allowing them to come in contact with gases, liquids, and solids but they are to retain the property of permitting a portion of the light to be reflected and a portion to be transmitted.

The glass or plastic forms may be colored as well as colorless. The light transmitted as well as the light reflected by the films may be the same as well as different in color from the color of the original illumination at the source. It will be recognized that a portion of the light from the source of illumination will be absorbed by the metallic film and a portion will be absorbed by the base material. The thickness or thinness of the film is preferably such, however, that the minimum amount of light transmitted is not less than about 5% of the unabsorbed light and that the maximum amount transmitted is not greater than about 95% of the unabsorbed light. The remainder of the unabsorbed light is reflected. In general it is preferable in a given

fixture that the light transmission of the metallic film vary from about 30% as a minimum to about 90% as a maximum of the transmission which is possible after the absorption of a portion of the light by the base material and another portion by the specific metallic film.

Generally speaking, it is preferable to apply the metallic substances by evaporation of the respective metals or metal substances upon the transparent or translucent globes, forms or fixtures in an evacuated space, but other methods of application may be employed. In some cases the fixtures may have fine particles possessing metallic reflections embedded or partially embedded in the body thereof. In other cases the surface of the fixtures may be coated only in specified areas or according to a pre-determined pattern with uncoated portions between the coated areas. In such event any given coated area may be of the same density throughout or of a varying density. Alternatively, the fixture may be made up of a number of separate parts, plane or curved, each of which is uniformly coated with the same or different film thickness.

It will be understood that in practicing the invention either the interior or the exterior of the lighting fixture, or both, may be treated in the manner described. As a general rule the metallic film is to be thinner or more transparent the farther the beam traversing the film is to cast its light. In the ordinary type of lighting fixture the thickness of the film will diminish in that portion of the fixture which is to be disposed farther from the light source.

Throughout the specification and claims, the expression "lighting fixture" is used to cover a means employed in conjunction with a source of artificial illumination in order to distribute the illumination. The invention can be applied not only to lamp shades but to the wall of the bulb, gaseous discharge tube or the like.

It will be understood that other variations may be made in the method and product without departing from the invention.

Having thus described the invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. A lighting fixture of the semi-indirect type of the character described comprising a shade for use around a light bulb or the like, said shade being coated with a metallic light transmitting-reflecting film of varying gradations of thickness, the thickness of said film being in general thinner the farther the beam traversing the film is to cast its light to thereby obtain a more uniform distribution of light at various distances from the light source.

2. A lighting fixture for indirect illumination comprising a shade having a base of uniform thickness for use around a light bulb or the like, said shade being coated with a metallic light-transmitting-reflecting film of varying gradations of thickness, the thickness of said film being such as to permit the transmission of a material quantity of unabsorbed light through said film while reflecting the remainder of the unabsorbed light, the thickness of the film being greatest at the surface closest to the light source and diminishing as the distance between the surface of the shade and the source of illumination increases, said metallic film varying continuously in any one direction over the surface of said shade in its capacity to reflect and transmit illumination.

SIMON FREED.