Feb. 19, 1957 M. PIPKIN 2,781,654

COATED LAMP

Filed Oct. 1, 1953

Fig. 1

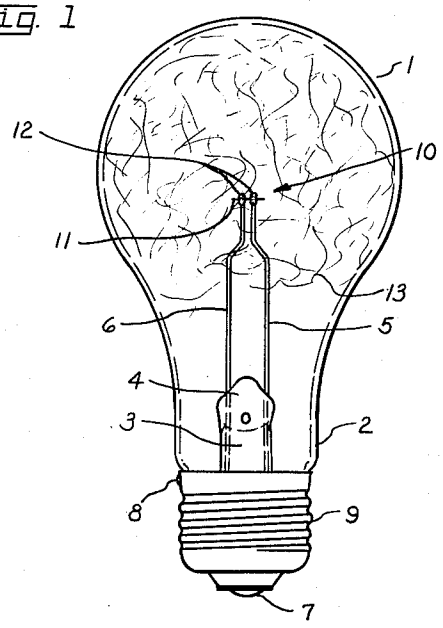


Fig. 3

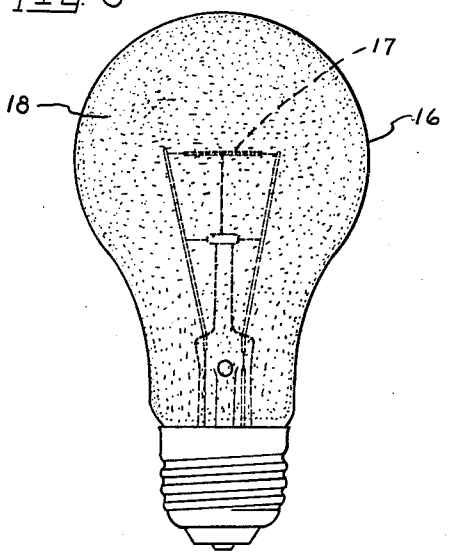
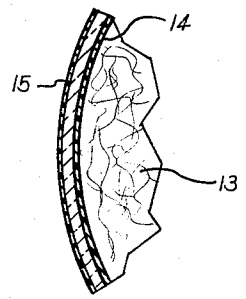


Fig. 2



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2,781,654

COATED LAMP

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Application October 1, 1953, Serial No. 383,529

9 Claims. (Cl. 67—31)

My invention relates to electric lamps in general and particularly to lamps of the incandescent and photoflash type and more particularly to indicating and light-diffusing protective lacquer coatings for said lamps.

This application is a continuation-in-part of my application Serial No. 352,259, filed April 30, 1953, now abandoned, and assigned to the assignee of this application.

In flash lamps for example of the type comprising a bulb or envelope of glass or similar material and containign a charge of readily combustible light-giving material which, on ignition, burns with great rapidity to produce a momentary flash of actinic light, the bulb is customarily provided with a protective coating of a suitable material such as a lacquer for instance. A protective coating or lacquer is applied to the interior bulb wall as well as the outside bulb surface in order to strengthen the bulb and prevent the cracking thereof, upon charge flashing, by hot burning particles of the combustible material. Since the lacquer coatings preferably used on the interior of the bulbs are of a clear or colorless character, it is difficult to detect which bulbs have and which have not been provided with an interior coating. This difficulty is particularly troublesome in the mass production manufacture of such type lamps where, because of the large numbers of bulbs handled, uncoated bulbs are apt to become intermingled with coated bulbs and processed and made into finished lamps in the usual way. Such uncoated lamps would then be hazardous because of the possibility of the bulb cracking and exploding on charge flash with resultant danger of injury, either to the user or the subject being photographed, from flying glass fragments.

The protective lacquer coatings applied to the outer bulb surface have also usually been of a clear or colorless character thus requiring a high degree of clarity in the finished lamp to be acceptable to the ultimate consumer. These previously used outside lacquer coatings have also failed to provide any diffusion of the actinic light generated upon flashing of a lamp.

It is one object of my invention, therefore to provide a flash lamp of the above-described character having a light-transmitting bulb provided with an interior protective coating the presence of which is readily ascertainable and which is substantially clear and colorless in the finished lamp.

Another object of my invention is to provide a bulb for a flash lamp or other lamp device having a protective coating on its inner surface which is substantially visible under normal lighting conditions during manufacture, but which can be rendered invisible by curing with heat prior to final assembly of the lamp components.

Still another object of my invention is to provide a lacquer coating on the outer surface of bulbs used in electric lamps capable of protecting the bulb surface and also acting as a light-diffusing film.

A feature of the invention in one of its aspects is the application of an interior lacquer coating to a flash lamp bulb, for example which, when dried in air, assumes a frosted or white color, thus permitting visual inspection to determine that the interior coating has been applied, and also permits a rapid, visual quality check on the thickness and distribution of the coating. When the bulb is sufficiently heated to obtain a proper cure prior to final assembly of the lamp components, the inside lacquer, made according to one aspect of my invention, becomes clear or transparent similar to other lacquers used for such purpose.

Another feature of my invention is the application of an external lacquer coating to electric lamp bulbs, incandescent as well as photoflash, which assumes a frosted, white appearance upon air drying and thus diffuses the light generated by the lamps with no material loss in light output. This outside coating also strengthens and protects the bulb, resists heat and indicates uniformity of thickness of the applied film. The usual clear, protective lacquers applied to the outer surface of flash lamps, for example, have been difficult to apply uniformly and, after application, the lack of uniformity has been virtually impossible to detect. This lack of uniformity frequently results in numerous thin spots in the lacquer coating thereby destroying its utility as a bulb strengthener or in containing the glass fragments should the bulb shatter. The frosted exterior lacquer of my invention gives a positive visual indication when uniformity of thickness is lacking in that any thin spots in the coating show up as clear, colorless areas which, in contrast to the frosted surrounding film, are readily detectable.

The frosted or white character of the external lacquer can be regulated by variations in the lacquer composition to obtain a film ranging from a very light frosting to a pure white.

Further objects and advantages of my invention will appear from the following description of a species thereof and from the accompanying drawing in which:

Fig. 1 is an elevation of a flash lamp illustrating one feature of my invention,

Fig. 2 is a fragmentary sectional view of the bulb thereof, and

Fig. 3 is an elevation, partly in section, of an incandescent lamp having a bulb coated in accordance with one aspect of my invention.

Referring to the drawing, the invention is there shown as applied to a flash lamp (Fig. 1) of the type comprising a sealed light-transmitting bulb or envelope **1** of glass or other suitable material and provided at its neck end **2** with a re-entrant stem **3** which extends into the bulb and terminates at its inner end in a press or seal portion **4** through which are sealed a pair of lead-in wires **5** and **6** connected at their outer ends to the center contact **7** and shell **8**, respectively, of a base **9** cemented or otherwise secured to the neck end of the bulb. The said lead-in wires **5**, **6** extend into the bulb in more or less side-by-side relation and are provided at their inner ends with an ignition means **10** which may comprise a filament **11** connected across the lead-in wires and consisting of a short length of tungsten wire, for instance. The inner ends or tips of the lead-in wires **5**, **6** are provided with small beads or coatings **12** of a suitable primer or fulminating material such as, for example, a mixture of zirconium, magnesium and potassium perchlorate powders bonded together by a suitable binder such as nitrocellulose. The primer beads **12** are located on the lead-in wires **5**, **6** at the region of the connection of the latter to the filament **11** so as to embed at least the end portions of the filament **11** and thus become ignited thereby upon passage of an electric current through the filament.

Disposed within the bulb **1** and around the ignition means **10**, so as to be within effective ignition range

thereof, is a charge of readily combustible light-giving material **13**, such as leaf foil, wire, shredded foil, or ribbon which, on ignition by the igniter means **10**, burns with great rapidity to produce a momentary flash of actinic light. In the particular lamp illustrated, the light-giving material **13** comprises a loose filling of filamentary material (such as shredded foil for instance) of a readily combustible composition, such as aluminum, magnesium or alloys thereof. The bulb **1** further contains a gas filling, such as oxygen for instance, at a suitable pressure for supporting combustion of the charge **13** of light-giving material.

To strengthen the bulb and minimize cracking thereof upon charge flashing, and also to prevent scattering of glass fragments in case the bulb actually should explode during flashing, the bulb **1** is coated interiorly, and exteriorly as well, with protective coatings **14** and **15**, respectively (Fig. 2), of suitable materials, such as a lacquer for instance. In the past these protective coatings **14** and **15** have been of a clear or transparent character; however, I prefer that either or both of these coatings be of a frosted, light-diffusing character. This frosted effect may be of a temporary nature, as illustrated below with respect to interior coatings, or permanent as mentioned later in regard to both interior and exterior lacquers.

Another feature of my invention is illustrated in Fig. 3 which is a conventional incandescent lamp having a sealed glass bulb **16** containing a tungsten filament **17**, said bulb **16** being either gas-filled or evacuated. A translucent coating **18** of my invention is shown as applied to a surface of said bulb **16** to diffuse the light and strengthen the glass.

In the production manufacture of flash lamps of the type described above, the bulb **1** is first provided with the inside coating **14** by spraying or other suitable means after which the charge **13** of combustible material is introduced into the bulb through the open neck end thereof, the stem **3** then sealed into the bulb which is filled with oxygen, and the base **9** attached thereto and the lamp then coated exteriorly with lacquer. Because of the transparent, and therefore undetectable character of the inside coatings previously used, it is difficult to determine, during subsequent manufacturing operations, whether or not such an inside coating is actually present in the bulb. As a result, uncoated bulbs are apt to become fabricated into finished lamps which, if subsequently detected and discarded, represent a manufacturing loss on the one hand, but if not detected and discarded are potentially dangerous to the ultimate consumer because of the possibility of the uncoated bulb cracking and exploding on flashing of the lamp.

In order to permit ready detection of the presence of the inside protective coating **14** in the bulb prior to introduction of the combustible material **13** and sealing of the stem **3** into the bulb, the said coating **14** is formed in accordance with one aspect of the invention of a material which, when dried in air, assumes a non-transparent character, for instance a frosted or white color, and yet when properly cured with heat prior to assembly of the lamp assumes a clear or transparent character. Thus, when bulbs are cured just prior to final lamp assembly, a rapid visual inspection will insure that only interiorly frosted bulbs are cured and assembled, eliminating the possibility of a lamp being assembled without an interior protective coating. It will be noted that the curing step may be omitted, thereby leaving the interior film in a frosted condition without eliminating the benefits of fast and accurate visual inspection. The advantage to be gained by this latter practice is that the frosted film acts as an excellent diffuser of the light generated by the lamp and this light diffusion is accomplished with little or no loss of light output.

After the bulb is inspected to determine the presence and uniformity of the interior coating, it may be cured,

combustible material introduced into the bulb, the stem sealed in and the base attached. At this point the bulb is coated exteriorly with a suitable outside lacquer **15**. In the past, these outside lacquers have also been of a clear, colorless character. Thus, when both inside and outside protective lacquers are colorless, it is essential that the lamp be crystal clear to be acceptable to the consumer, thereby necessitating the rejection of all lamps bearing slight blemishes although these blemishes would have no effect on lamp performance. This difficulty would be completely eliminated by the application of the frosted lacquer of my invention to exterior bulb surfaces accompanied by the aforesaid additional advantages, such as excellent light diffusion with no loss in light output and increased strength and heat resistance. The clear lacquers previously employed as exterior protective coatings had a further disadvantage in that extremely thin coating frequently occurs in small areas on the bulb surface, which areas are virtually undetectable and considerably reduce the effective protection afforded by the coating. The frosted lacquer of my invention is self-indicating due to its property of becoming colorless when applied in extremely thin films. Thus, any thin areas that occur on application of the lacquer are visually detectable as clear spots in contrast to the surrounding frosted film. Rapid visual inspection can easily determine the sufficiency and uniformity of the frosted exterior protective coating.

I have found that lacquer compositions heretofore employed may be modified in a manner to achieve the desired results. For example, a well-known interior lacquer comprising a mixture of polymerized vinyl ester and cellulose nitrate may be modified by the addition thereto of hydrolyzable silicic acid esters as clouding agents. I have found that the tetraethyl ester of ortho-silicic acid (tetraethyl ortho-silicate, $(C_2H_5)_4SiO_4$) hereinafter referred to as ethyl silicate, is the preferred ester due to the ease and facility with which it accomplishes the objects of the invention, its commercial availability and relative economy. Similarly, all well-known exterior lacquers, such as cellulose acetate for example, may be modified in the same manner.

Good results may be attained when the interior surface of a bulb is coated with a lacquer comprising essentially about 300 to 400 parts by weight polymerized vinyl acetate (Vinylite) resin solution, about 5 to 100 parts by weight acetone, about 20 to 70 parts by weight alcohol, about 93 to 146 parts by weight nitrocellulose solution, and about 50 to 150 parts by weight ethyl silicate. Excellent protective and diffusing coatings result when exterior bulb surfaces are covered with a lacquer comprising acetone, alcohol, cellulose acetate and ethyl silicate. Specific examples of representative interior as well as exterior lacquer compositions according to my invention are as follows:

Example A.—Interior lacquer

	Parts by Weight	Approx. Percent
Polymerized vinyl acetate (Vinylite) resin solution (containing around 68 to 74% solids)	376.0	51.50
Acetone	37.6	5.15
Alcohol, denatured (Synasol)	56.4	7.72
Nitrocellulose solution (containing about 16–17.5% solids)	143.0	19.60
Ethyl Silicate	117.0	16.03
	730.0	100.00

The nitrocellulose solution used in the specific example consists of 16–17.5% of 5 to 6 second grade dry nitrocellulose dissolved in equal parts of ethyl and isopropyl acetate. This solution has a viscosity of 50 to 65 seconds at 25° C. in a #20 Parlin cup.

The acetone is added as a thinner and the amount used may vary over a fairly wide range according to the desired lacquer viscosity which also provides a means of

controlling the thickness of the interior coating applied. The alcohol of the example is 190-proof denatured ethanol. The amount of alcohol used should not exceed an upper limit of around 10% by weight of the total mixture, since too great an excess will cause the solids to come out of suspension. The amount of nitrocellulose used should not exceed about 20% by weight of the total mixture, because greater amounts tend to cause a blackening or charring of the inside lacquer coating when the bulb is heated to seal in the stem portion. However, a sufficient amount should be used to harden the Vinylite, otherwise the coating will not have the requisite strength.

It will be noted that the composition is not limited with respect to volatile solvents and diluents since other materials of the type illustrated in the example including esters and ketones, such as methyl acetate, ethyl acetate, methyl-ethyl ketone, and diluents such as butyl alcohol, toluol, etc. may be used provided sufficient active solvent is present to afford complete solution of the nitrocellulose. Nor is the composition limited with respect to the principal lacquer ingredients since other lacquers, such as acrylic acid esters, cellulose esters and mixtures of vinyl resins and cellulose ester lacquers, may also be modified with ethyl silicate.

Example B.—Exterior lacquer

The solvents are mixed in the following proportions:

	Gallons	Percent by Weight
Acetone	7.52	80
Denatured Alcohol	.91	10
Di-acetone Alcohol	.79	10

Cellulose acetate is added to the above mixture as follows:

	Pounds	Percent by Weight (Total)
Cellulose Acetate	11	15

After the cellulose acetate has been dissolved in the solvents, ethyl silicate is added in amounts of about 200 cc. per gallon of lacquer which in the above specific example would amount to about 1.84 liters.

The acetone of the above example is the principal solvent for cellulose acetate, being very active and possessing a high evaporation rate. A suitable solvent for cellulose acetate possessing similar characteristics, such as ethylene dichloride or tri-cresol phosphate for example, may be substituted. Denatured alcohol (190-proof ethanol) is added as a latent solvent and it will be understood that other suitable latent solvents, such as isopropyl alcohol for example, may be substituted. The ethyl silicate may range from 15 to 400 cc. per gallon of lacquer depending on the degree of opacity desired. The density of the frosted effect may thus be varied from very light to a dense, almost pure white.

In previous lamp lacquers of the clear or colorless character, a discoloration frequently occurred which was commonly known to those skilled in the art as "blushing." This was caused, at least in part, by too rapid evaporation of the solvents and as a remedy an additional solvent for the principal lacquer ingredient, having a low evaporation rate but capable of complete evaporation, was added. In Example B, di-acetone alcohol as a solvent for cellulose acetate was found to possess the desired properties to prevent "blushing." Ethyl lactate is another example of a solvent suitable for this purpose. However, since the lacquer of my invention as illustrated in Example B possesses a frosted, white character, "blushing" may not prove detrimental, thus eliminating the necessity for the addition of this latter type solvent.

It will be further understood that this feature of my invention is not limited to lacquers of the type illustrated. I have discovered that practically all lacquers suitable for coating glass surfaces, such as acrylic acid esters (methacrylates and Acryloids for example), cellulose esters and mixtures of vinyl resins and cellulose esters, may be modified with ethyl silicate to produce the desired diffusing effect. I have also found that certain other compounds may be added to the lacquers of my invention to enhance certain desirable properties. For example, up to 10% by weight sucrose octa acetate may be added to improve the abrasion resistance of the lacquer film thus rendering it less susceptible to weakening scratches and checks. This addition also improves the moisture resistance and prevents the formation of small bubbles in the film. Although the heat resistance of lacquer films is greatly improved by the addition of ethyl silicate, in lamps where considerable heat is rapidly generated such as photoflash lamps, some charring or bubbling of the lacquer film does occur. This effect may be reduced by the addition of tri-phenyl phosphate in amounts of about 10% by weight. The moisture resistance and toughness of the film is also improved. The addition of small amounts of polyethylene terephthalate is also beneficial in that the strength of the lacquer is greatly increased thus permitting the use of thinner films while affording the same or greater degree of protection and effecting an economy in lacquer materials. This material also improves the dimensional stability of the lacquer, thereby reducing the tendency of the film to expand or contract and separate from the glass with variations in temperature.

In the manufacture of flash lamps in accordance with one aspect of the invention, the interior of the bulb 1 is coated with lacquer 14, for example that illustrated in Example A, by spraying or other suitable means, the lacquer then being air dried until it assumes a frosted or white color. The interiorly coated bulbs are then transferred to the assembly point where they are cured with heat prior to being filled with the charge of combustible material. Inspection prior to the curing operation and discarding all bulbs not having a frosted or white interior color, or which are only partially white colored, will prevent unlacquered and incompletely lacquered bulbs from being fabricated into finished lamps. After the curing operation the bulbs may be again inspected to ascertain that the interior coating has been properly cured. That has been accomplished when the lacquer has assumed a completely clear or transparent character. Rejection of cloudy bulbs prior to assembly of the lamp components, coupled with the previously mentioned discarding of unlacquered and incompletely coated bulbs prior to curing, thus prevents the fabrication of these bulbs into lamps which would be of defective and potentially dangerous construction. The modified lacquer allows the inspection of the bulbs for presence of inside coating prior to sealing of the stem and attachment of the base thereto, which is preferable because of the saving in time as well as stems and bases which otherwise would be discarded along with the bulb if the lamp were finished before inspection, thus reducing manufacturing costs. After inspection, curing and completion of the lamp as described, a suitable lacquer is customarily applied to the exterior surface to further strengthen and protect the lamp.

In the curing operation mentioned above, the interiorly coated bulb is heated at about 60–70° C. for a period of about 3–8 minutes, preferably 5 minutes. A proper cure has been achieved when the frosted interior coating has assumed a completely clear or transparent appearance. The curing step also serves to remove excess solvent in the lacquer.

If a diffusing coating is desired, the interior lacquer of Example A may be left in the frosted condition by elimination of the curing step. This also eliminates the

necessity for the second inspection to determine complete curing while retaining the benefits and ease of the first inspection. The lacquer of Example B may also be applied to the interior of the bulb if a permanently frosted coating is desired with the same beneficial results as the lacquer of Example A.

While the reactions are complex and have not been definitely ascertained, it is believed that the desired frosted appearance is achieved on air-drying of the lacquer of the type illustrated in Example A by the evaporation of the solvents (acetone and alcohol) leaving Vinylite, nitrocellulose and ethyl silicate as a three-component, immiscible system in which the said immiscibility of the components rather than any particular component produces the frosted appearance. Upon curing the air-dried film as previously mentioned, the ethyl silicate, which is the most volatile component of the immiscible system, evaporates leaving what appears to be a colorless solution of Vinylite and nitrocellulose which are apparently miscible, rendering the final heat-cured lacquer film clear and colorless.

In lacquer compositions of the general type illustrated in Example B, customarily used to coat the exterior surface of glass bulbs and the like, the reactions are somewhat different. The permanently frosted appearance is produced on air-drying of the lacquer, possibly by hydrolysis of the ethyl silicate. That is, the ethyl silicate in the lacquer decomposes in moisture present in the alcohol (5%) or in the air, forming a hydrate of silica, possibly silicic acid (an insoluble white pigment) or some compound of silica and water, which produces the permanently frosted or white color in the lacquer. Thus, normal heat-curing at temperatures of about 60° C. does not affect the frosted condition. Even at considerably elevated temperatures of about 300° C. only a small amount of water is driven off and, although there may be some change in the crystal structure of the silica compound, the lacquer retains its frosted appearance.

While I have generally shown and described the invention as applied to flash lamps and particularly those of the type having a loose filling of combustible material, such as wire, ribbon, shredded foil or leaf foil, it should be understood that the invention is applicable to any type of photoflash lamp containing combustible material such as, for example, those of the so-called primer type as disclosed in U. S. Patent No. 2,291,983, Pipkin, wherein the combustible material is in the form of small beads or coatings of a fulminating paste provided on the inner leads of the lamp and embedding at least the end portions of the ignition filament.

However, or greater significance and of primary importance is the application of my invention to all types of incandescent lamps. For instance, lacquer coatings of the type shown in Example B may be applied either to the inner or outer surface of ordinary incandescent lamp bulbs to provide protection for the bulb and efficiently diffuse the light, thereby reducing bright spots or glare from the incandescent filament without noticeable loss in light output. Thus, a controlled degree of opacity may be easily obtained in the lamp by applying the lacquer of my invention using any well-known means of lacquering glass such as spraying, dipping, etc., without acid etching or depositing silica powder inside the bulb by combustion of a silica compound. Also, the frosted coating, whether on the inner or outer surface of the bulb, may be readily inspected for uniformity, any thin spots in the coating showing up as clear areas on the bulb surface in contrast to the surrounding frosted coating.

In miniature incandescent lamps, such as flash light lamps for instance, the protective, light-diffusing coating of my invention is particularly useful since the extremely small size of the bulb renders acid etching or the deposition of powdered silica extremely difficult.

I have found in addition that color pigments may be added to the lacquers of my invention, making it possible to produce any desired shade or color in the frosted, light-diffusing film which is uniform, vivid and pleasing to the eye. This aspect of my invention has particular application to Christmas tree lamps in that, in addition to strengthening the bulb and producing any desired color, it is considerably more economical than the enameling method previously employed. In both the miniature and Christmas tree incandescent lamps the advantages of ease and rapidity of visual inspection are present to the same degree as in other types.

Although preferred embodiments of my invention have been disclosed, it is recognized that variations and changes may be made therein within the spirit and scope of the invention as defined by the appended claims.

It is understood further that the ingredients, their proportions as given above and also the times and temperatures can be varied, independently and in relation to each other, within fairly wide limits to obtain the desired results. Further, it will be particularly recognized that my invention is not limited with respect to principal lacquer ingredients, good results being obtained with any type lacquer suitable for application to glass surfaces such as for example, methacrylates, Acryloids, cellulose esters, mixtures of vinyl resins and cellulose esters, and other thermo-setting or thermoplastic lacquers.

What I claim as new and desired to secure by Letters Patent of the United States is:

1. An electric lamp comprising a glass bulb containing a light source and having thereon a coating of an organic lacquer comprising essentially the dried product of a material selected from the group consisting of the acrylic acid esters, cellulose esters and mixtures of vinyl resins and cellulose esters, and about 15 to about 400 cubic centimeters of the tetraethyl ester of ortho-silicic acid per gallon of said lacquer.

2. An electric lamp comprising a glass bulb containing a light source and having on said bulb a coating of an organic plastic lacquer composed essentially of the dried product of a material selected from the group consisting of the acrylic acid esters, cellulose esters and mixtures of vinyl resins and cellulose esters, and about 15 to about 400 cubic centimeters of an ester of silicic acid per gallon of said lacquer.

3. An electric lamp comprising a glass bulb containing a light source, a surface of said bulb having thereon a translucent coating of an organic lacquer material comprising the dried product of a cellulose ester, solvents therefor and about 15 to about 400 cubic centimeters of an ester of silicic acid per gallon of said lacquer material.

4. An electric lamp comprising a glass bulb containing a light source, a surface of said bulb having thereon a translucent coating of an organic lacquer material consisting essentially of the dried product of cellulose acetate, acetone, alcohol and about 15 to about 400 cubic centimeters of tetraethyl ester of orthosilicic acid per gallon of said lacquer material.

5. An electric lamp comprising a glass bulb containing a light source, the exterior surface of said bulb bearing a translucent coating of organic lacquer consisting of the dried product of a mixture of about 80 parts by weight acetone, about 10 parts by weight alcohol and about 10 parts by weight di-acetone alcohol in which is dissolved about 15 parts by weight dry cellulose acetate, and about 15 to about 400 cubic centimeters of tetraethyl orthosilicate per gallon of said lacquer.

6. A flash lamp comprising a substantially clear glass envelope containing a quantity of readily combustible material adapted to generate on combustion a flash of actinic light, said envelope having its interior surface provided with a coating consisting of the heat-cured product of an air-dried film of a lacquer material consisting essentially of a polymerized vinyl ester, about 15 to about 400 cubic centimeters of hydrolyzable silicic acid ester per gallon of said lacquer material, cellulose nitrate solution, and thinners therefor.

7. A flash lamp comprising a substantially clear glass envelope containing a quantity of readily combustible material and combustion-supporting means adapted to generate on combustion a flash of actinic light, said envelope having its interior surface provided with a coating consisting of the heat-cured product of an air-dried film of a lacquer material consisting essentially of polymerized vinyl acetate resin solution, about 15 to about 400 cubic centimeters of tetraethyl ester of ortho-silicic acid per gallon of said lacquer material, cellulose nitrate solution, alcohol and a thinner therefor.

8. A flash lamp comprising a substantially clear glass envelope containing a quantity of readily combustible material and combustion-supporting means adapted to generate on combustion a flash of actinic light, said envelope having its interior surface provided with a coating consisting of the heat-cured product of an air-dried film of a lacquer material consisting essentially of about 300 to 400 parts by weight polymerized vinyl acetate resin solution, about 93 to 146 parts by weight, not exceeding 20% of total weight, cellulose nitrate solution, about 50 to 150 parts by weight ethyl silicate, about 20 to 70 parts by weight, not more than 10% of total weight, alcohol, and about 5 to 100 parts by weight acetone.

9. A bulb for electric lamps and similar articles made of clear glass, and a frosted white protective lacquer coating on the inner surface of said bulb, said coating having the property of becoming clear and colorless when subjected to heat of about 60—70° C. for about 5 minutes, said coating comprising essentially the dried product of a polymerized vinyl ester, about 15 to about 400 cubic centimeters of ethyl silicate per gallon of said lacquer coating, cellulose nitrate solution, alcohol and a thinner therefor.

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