April 21, 1942. F. KALLUS 2,280,489

FROSTED LAMP

Filed Oct. 6, 1939

Fig. 2

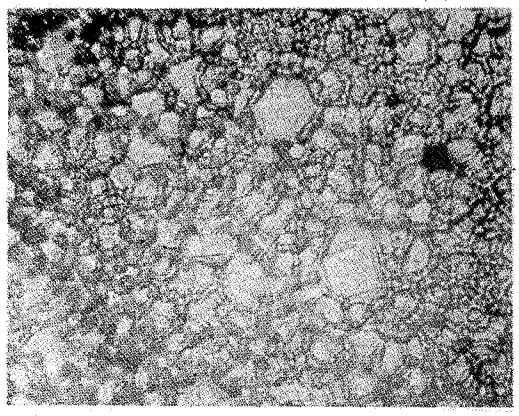
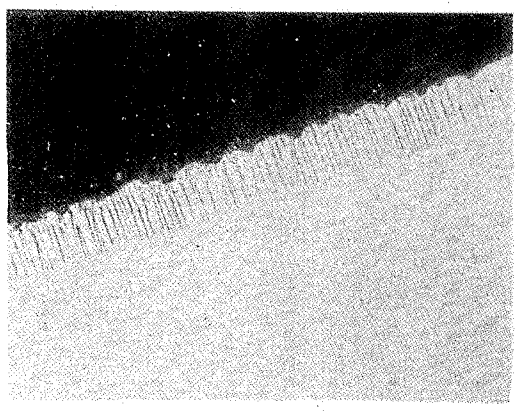


Fig. 3



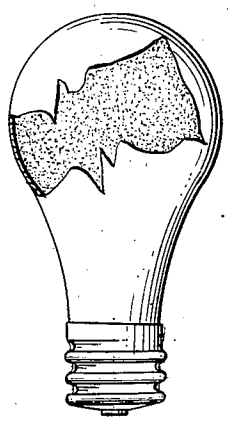


Fig. 1

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Patented Apr. 21, 1942 2,280,489

UNITED STATES PATENT OFFICE

2,280,489

FROSTED LAMP

Frederick Kallus, Hoboken, N. J.

Application October 6, 1939, Serial No. 298,202

4 Claims. (Cl. 176—16)

This invention relates to electric light bulbs of the inner frosted type.

It is common in the lamp art to etch the interior of transparent glass lamp bulbs by means of a solution containing hydrofluoric acid, this acid serving to form a multiplicity of irregular channels or crevices which diffuse the light when the bulb is used for an electric lamp. In my prior Patent No. 2,098,582 dated November 9, 1937, I describe an improved method for frosting lamp bulbs utilizing a dilute solution of etching fluid in conjunction with a subsequent treatment of the etched surface by means of steam. Glass, particularly the thin glass of electric light bulbs, when etched is weakened structurally and becomes brittle unless there is some subsequent treatment having the effect of annealing or tempering. In some cases this is accomplished by a second treatment with a solution of the etching fluid more dilute than that used in the first treatment. As described in my patent, steam accomplishes a similar result in some manner not clearly understood by relieving the strain of the glass material and eliminating the fragility.

An object of the invention is to produce a frosted lamp bulb in which a high degree of rigidity of the etched surface is obtained.

An object also is the production of a frosted lamp bulb surface in which the glass material assumes in section an undulating contour.

Additional objects relate to the production of an etched surface containing pseudo-crystalline polyhedrons; having a striated fracture adjacent the surface; and possessing pronounced resistance to fracture.

Other objects will appear on consideration of the following description of the process and product, and of the accompanying drawing, in which:

Fig. 1 is a lamp bulb to which my invention is applied;

Fig. 2 is a photomicrograph of a glass surface etched in accordance with my process; and

Fig. 3 is a transverse section through a glass surface etched according to my process.

In my co-pending application Serial No. 400,381, filed June 30, 1941, I have described a process for making frosted lamps which employs steam at a temperature preferably below 450° C. as an annealing agent after the etching step has been completed.

The lamp bulbs frosted in accordance with my process are found to have special characteristics arising from the nature of the etched surface. Etching, since it removes material, ordinarily weakens the glass, this being due primarily to sharp angle crevices on the glass surface forming a line of weakness inducing fragility. Various means have been suggested for overcoming this fragile condition, such as a second treatment of etching fluid diluted to reduce the speed of action, and other means. In my process I overcome the fragile characteristic of the glass by the use of steam immediately after the etching bath, thus stopping the etching action and producing a modified preliminary annealing of the surface subjected to strain. The final annealing step completely removes any strain distortions and rounds out all angular crevices so that ample strength is imparted to the glass wall to permit handling and use as electric lamp bulbs.

In Figs. 2 and 3 are illustrated photomicrographs of the etched surface of glass frosted in accordance with my method. It is pointed out that the surface is crystalline in appearance, there being large protuberances of a polyhedral or pyramidal type having usually four or six sides with the area intermediate the protuberances taken up by small protuberances, the amount of unformed material being practically negligible. A section taken through this material, as indicated in Fig. 3, shows an undulating line and also shows that the glass has striations or grains, the same being normal to the surface tangent. These characteristics are such as to distinguish a product of maximum strength and high refractability for light, so that electric lamps manufactured from these bulbs diffuse light with superior efficiency. This may be apparent when it is considered that the light beams are refracted not only by the prism-like projections of the etched surface but also by the striated sub-stratum adjacent this surface.

Modifications of the invention may be made and hence I do not desire to be restricted in the scope of my invention other than may be determined by the claims hereto appended.

I claim as my invention:

1. A glass lamp bulb having an etched interior surface formed of multiple, irregularly shaped, fissure-separated masses of different sizes whereby the glass surface is roughened, the glass beneath the surface having a plurality of striations extending substantially normal to the tangent curvature of said surface.

2. A glass lamp bulb having an etched interior surface formed of multiple, irregularly shaped, fissure-separated masses of different sizes whereby the glass surface is roughened, the glass beneath the surface having a plurality of stria-

tions extending substantially normal to the tangent curvature of said surface, the length of said striations exceeding the maximum depth of said fissures.

3. A glass lamp bulb having a roughened interior surface, the glass beneath said surface being striated.

4. A glass lamp bulb having a surface formed of grain-like masses separated by fissures, the glass beneath said surface being striated and the number of striations materially exceeding the number of surface masses.

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