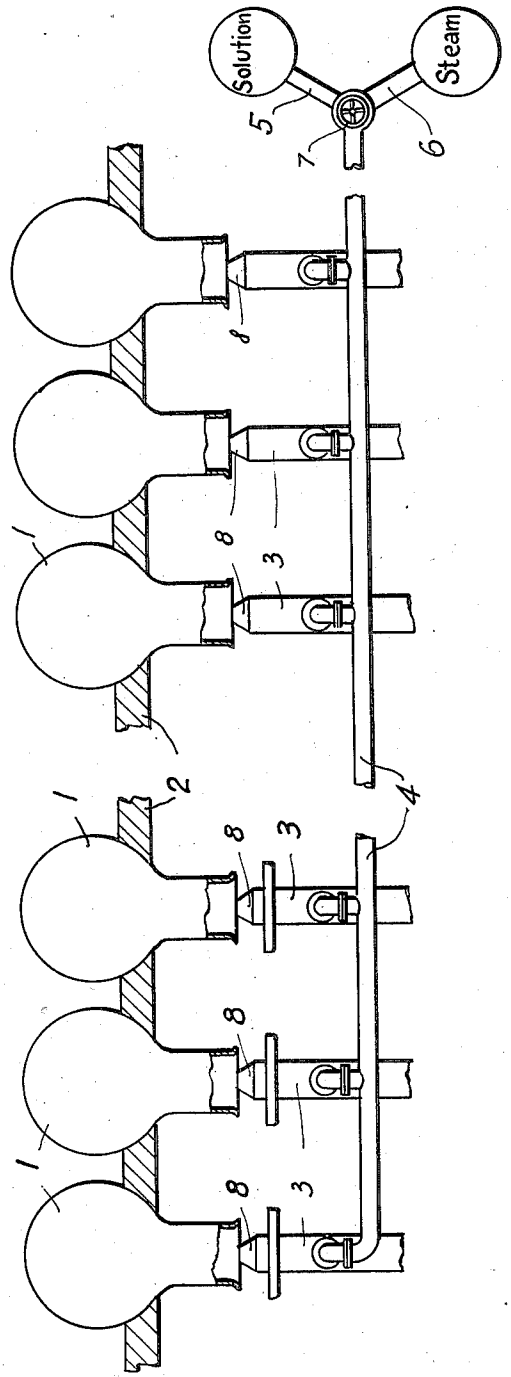
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ELECTRIC LAMP BULB

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ELECTRIC LAMP BULB

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3 Claims. (Cl. 41—42)

This invention relates to electric lamp bulbs and more particularly to a new and improved process of producing interior frosted bulbs therefor.

For many purposes, particularly for the purpose of obscuring the filament and diffusing the light from an electric light bulb, it is desirable to produce a frosted appearance upon the glass, that is to break up its inner surface so that the light is refracted and dispersed thereby, to prevent glare to the eyes by direct vision of the filament.

As this invention is particularly applicable to producing an inner frosting upon electric light bulbs, it is particularly described in connection therewith, although certain features of it may prove of broader and more general application.

Glass, as is well known, is, generally speaking, a compound silicate or mixture of silicates which may be etched or frosted by certain acids and acid salts, such for example as by hydrofluoric acids or by salts thereof, such as ammonium fluoride. In the common use of such compounds, however, difficulty is experienced, in that the effect upon the glass is to leave it too fragile to withstand commercial manufacture and transportation.

Attempts to remedy this defect by after treatment of the bulb, as for example, by washing off the acid and then retreating the bulb with a weaker solution of acid, have not been wholly satisfactory as such a process is cumbersome and requires repeated treatments of the glass.

It is an object of this invention to provide a process of etching which will be free from the foregoing defects and which will produce a sufficiently and satisfactorily frosted bulb which, without the necessity of any retreatment, will leave the bulb with substantially its original strength.

It seems needless here to discuss the various theories as to the cause of the fragility of bulbs which have been acid etched and immediately washed. The most probable of these explanations appears to relate to phenomena of crystallization from the etching fluids, but these theories are as yet unsubstantiated and none of them appears to have added to the practical solution of the question.

In accordance with this invention, it has been discovered that this fragility occurs when the glass is subjected to a sudden washing after the initial etching has taken place, and further, that the etching can be completed without making the bulb fragile by injecting steam into the bulb before the acid is removed. This steam may be introduced substantially at the time that the etching is completed and the effect can be controlled as desired by the quantity and rate at which the steam is introduced.

The invention accordingly comprises the several steps and the relation and order of one or more of such steps with respect to each of the others thereof, which will be exemplified in the process hereinafter disclosed, and the scope of the application of which will be indicated in the claims.

In the drawing there is illustrated an apparatus which may be employed in carrying out the invention, although as will be readily understood, the novelty of the process is not directly related to the apparatus.

In the drawing the numeral 1 designates a plurality of lamp bulbs which are held in some suitable support 2 as illustrated, with their mouths down. The numeral 3 indicates a plurality of upwardly projecting conduits connected in multiple by a conduit 4 and adapted to be connected, at will, either with a pipe 5 for supplying an etching solution which is preferably warm, or with a pipe 6 for supplying steam. These fluids are controlled by a valve 7 to admit one or the other or neither of the fluids. The upwardly projecting conduits 3 are spaced to correspond with the spacing of the open mouths of the bulbs 1 in the support. Each conduit has a projecting nozzle 8 extending substantially to the level of or into the neck of one of the bulbs.

To effect the frosting operation by this particular apparatus, therefore, the bulbs are placed in position, one over each of the nozzles, and thereupon the valve 7 may be turned to connect the conduit 5 with the conduit 4 to permit the etching solution to be sprayed onto the interior of the bulb. The nozzle 8 is preferably of the atomizing type to cause the etching solution to enter in atomized form, to apply an even coating over the inner surface.

The etching solution is allowed to remain upon the surface of the glass for a predetermined time, dependent upon its strength, its temperature, the nature of the glass, and the effect desired. Within reasonable limit, the longer the solution remains in contact with the glass and the higher its temperature, the greater the etching effect, until a maximum is attained.

When a proper quantity of the etching solution is admitted to the glass, the valve 7 may be turned to neutral position until the etching

has been completed to the desired degree, and then it may be turned to connect the conduit 6 with the conduit 4 to cause the steam to be admitted to the bulbs.

I have found in practice that it is desirable to admit a puff of steam and then shut it off for a few seconds until the steam has had an opportunity to condense upon the surface of the glass to effect a partial dilution of the etching fluid, whereupon the valve 7 may be again turned to admit steam until the acid is completely washed out of the bottle, which requires but a few seconds.

It will be readily understood that the admission of the etching fluid and the admission of the steam may be conducted at separate stations if desired, and it does not appear to be essential in all cases that the steam should be admitted in separate puffs although I have produced better results in that way.

It will also be understood that the etching solution may be spread upon the glass in any convenient manner, the atomizing nozzle here employed being but one practical method of achieving that result.

Particular advantages are achieved by injecting the steam into the bulbs, especially when it is done without moving the bulbs, as in this manner the expensive etching solution is economized and the cost of the etching greatly reduced. This comes from the fact that the steam will remove the solution without unduly diluting it and all the solution is returned directly to the solution tank.

Moreover, since these solutions are ordinarily used at a temperature of about 75° C. to 80° C., there is a tendency of the solution to dry out, which the injection of the steam counteracts.

In place of steam, I may employ water if the nozzles produce a sufficiently fine spray so that the etching solution is diluted gradually, but I have attained the best results by the use of steam.

Since certain changes may be made in carrying out the above process without departing from the scope of the invention, it is intended that all matter contained in the above description shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the following claims are intended to cover all of the generic and specific features of the invention herein described, and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

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

1. The process of frosting bulbs which comprises injecting into the bulb a frosting fluid and arresting the operation of said fluid by the direct application of steam.

2. The process of etching a bulb which comprises subjecting the same to an etching fluid and then without washing, immediately subjecting the same to the action of a limited quantity of steam and then after an interval of time, washing out the bulb.

3. The process of etching a bulb which comprises subjecting the same to an etching fluid and then without washing, immediately subjecting the same to the action of a limited quantity of steam and then after an interval of time, washing out the bulb by flooding with an additional quantity of steam.

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