Sept. 1, 1925.

1,552,128

M. ETTINGER ET AL

INCANDESCENT LAMP OR THE LIKE

Filed May 19, 1923

Fig. 1.

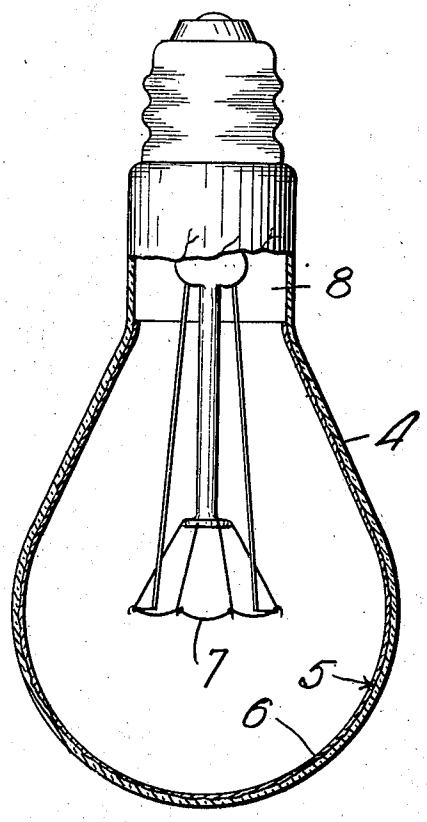


Fig. 2.

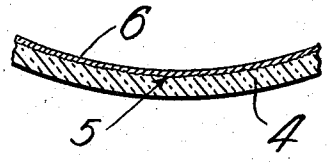
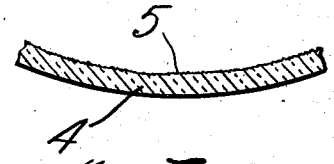


Fig. 3.



Max Ettinger and Clemens A. Laise
INVENTOR

BY

Frank J. Kent
ATTORNEY

Patented Sept. 1, 1925. 1,552,128

UNITED STATES PATENT OFFICE.

MAX ETTINGER, OF BROOKLYN, NEW YORK, AND CLEMENS A. LAISE, OF TOLEDO, OHIO.

INCANDESCENT LAMP OR THE LIKE.

Application filed May 19, 1923. Serial No. 640,249.

To all whom it may concern:

Be it known that we, MAX ETTINGER and CLEMENS A. LAISE, citizens of the United States, residing at Brooklyn, county of Kings, State of New York, and Toledo, in the county of Lucas and State of Ohio, respectively, have invented certain new and useful Improvements in Incandescent Lamps or the like, of which the following is a specification.

Our present invention aims to provide a novel and valuable process for operating various electrical appliances of the same general character, such as electrical resistance devices wherein the resistance element is a conductor adapted to be heated to incandescence by the passage of the electric current through said conductor, as, for example, either primarily to constitute the appliance a so-called illuminating lamp or primarily a so-called radio bulb.

In another aspect, the invention aims to provide, as a new article of manufacture, a novel and valuable electrical appliance of the type including a sealed container for the part of the conductor to be electrically heated to incandescence, and embodying certain important new features tending to improve the operating efficiency and prolong the life of an electric appliance as above indicated, and particularly an electric appliance wherein the container is a glass bulb, either exhausted or gas-filled, and frosted on an inside surface and preferably substantially all over such inside surface.

The invention involved in thus frosting the inside of the bulb of the electrical appliance aforesaid, is more fully described and claimed in our co-pending application Serial No. 640,248 filed May 19, 1923. In that application the term "frosted" as used therein is very carefully and exhaustively defined, so as not unfairly to limit that invention; and said term is used herein with the same significance, although such definitions will not be repeated here, but are to be read into this application, for purposes of brevity, by implication. It is in connection with such an interiorly frosted bulb that the present invention preferably if not necessarily is to be applied.

If, in addition to the frosting being on the inside of the bulb, pursuant to said co-pending application, we coat the inside with a thin film of beneficial chemicals, we have discovered by actual tests that we produce a still more marked improvement in our lamp. The beneficial chemicals that we introduce into the lamp and wherewith we coat the inside surface of the bulb are of a nature to serve two purposes. The first is to combine with any volatile bodies that may distill off the incandescent body, thereby to produce a white, whitish or translucent compound, and the second is to combine with the emitted molecules or particles from the incandescent body to produce a whitish or translucent substance and at the same time a volatile compound which will have a reversible reaction with the filament itself.

Thus if we have an incandescent body out of which nickel or iron may distill, we use for the first purpose potassium iodide, or other halogen or nitrogen compounds, which will form a translucent iron or nickel iodide or nitride in thin layers. And for our second purpose we may use a sodium or potassium chloride, which will combine with the tungsten if the light-emitting particles are tungsten and produce a halogen compound of tungsten. These halogen compounds of tungsten are opaque and volatile, and when vapors of the same come in contact with a non-uniform incandescent tungsten wire, such vapors act to deposit tungsten on the thinner spots and liberate the chlorine radical.

In some cases the one compound might serve the double purpose. Thus we have found that potassium iodide does very well for an incandescent body of tungsten containing small quantities of nickel and iron.

Expressed another way, our present invention is based on the discovery that if such interiorly frosted lamp bulbs (particularly when such interior frosting is the result of a roughening of the interior surfaces of the bulbs), are rinsed out or sprayed with certain weak chemical solutions (as halogen compound as aforesaid), these salts settle in the pores of the roughened inside surface of the bulbs, and have such a beneficial effect on the quality of the lamps as to increase both the life and efficiency thereof very much more than heretofore.

Whereas heretofore chemicals have been placed on the stems of lamps which in turn sometimes distilled off onto the bulb, such deposits were localized in spots and such lamps were usually rejected, owing to their poor appearance. We, however, introduce

our beneficial chemicals on the inside surface of the bulb and distribute them uniformly so the particles of tungsten or other metal distilling off the metallic filament will combine with the metal to produce a white compound, rather than a black deposit of metal, such as is the case in most blackening of lamps. Further, as above stated, we use such chemicals as will absorb the occluded gases emanating from the incandescent bodies, thereby to produce a volatile tungsten or metal compound of the kind having a reversible chemical reaction, so that such volatile matter again deposits metal on the thin spots of a tungsten filament when of non-uniform diameter wire, which differential diametral factor often causes lamps to be burned out prematurely.

In the lamp industry the useful life of a lamp is considered the time it takes a lamp to be reduced to 80% of its original candle power at standard efficiency. This reduction in candle power in lamps using an incandescent body of tungsten or other metals, is due to the blackening of the bulbs on the inside caused by fine particles of tungsten, or other fine metallic particles, distilling from the wire. The substances suitable to combine with these fine particles of metal are such, not only as will readily combine with them at the operating temperature of the lamp and produce a white or whitish compound, as aforesaid, but a compound which will merely increase the depth of frosting on the inside of the lamp and so not reduce the candle power of the lamp as a black or dark gray deposit would.

We have discovered, further, that halogen compounds of the alkali metals, such as potassium and sodium fluoride, iodide or chloride, are particularly suited to the purpose, also nitrides such as boron nitride. The chemicals to be selected depend upon the type of lamp and especially the temperature within the lamp. Therefore we are not to be limited to any particular salt or salts, since certain double salts or mixtures of salts have to be resorted to at times to obtain salts having a gradation of reaction temperature such as exist in the various types of lamps. We prefer to select such chemicals as will liberate in vacuum, ions which will freely combine with metallic ions distilling from the incandescent body, thus to produce a light deposit.

Again, nickel-tungsten alloy wires are much more easily manufactured than pure tungsten ones and are cheaper to manufacture. They have not been heretofore used extensively, however, since the nickel slowly distills out of the wire and blackens the bulb. The same is true of molybdenum-tungsten alloy wires. We find, however, that by using a bulb frosted by being roughened on the inside and coated with a chemical such as thallium chloride or potassium iodide, the fine particles of metal distilling off the alloy wire (such as one of nickel and molybdenum), combine with the halogen radicals and produce a whitish deposit instead of a black one thereby enabling one to use such wires instead of pure tungsten. Such a wire can also be more readily coiled without injuring the coils as is sometimes the case with tungsten, and the principle underlying the present invention is therefore also applicable to gas filled lamps.

As the invention is preferably carried out, the bulbs after they are frosted, are rinsed with a solution of either silicate or water with the thallium chloride, and then dryed out, leaving a thin deposit of the salt. After the lamps are exhausted, or, owing to the heated gases in gas-filled lamps, these salts are dissociated, the acid radicals or ions discharged while the lamps are being used combine with the metal particles which may distill off the wire, thereby frosting, or increasing the frosting on, the inside of the lamp.

In some cases we might use a binding material to hold the active chemicals against the inner roughened wall of the bulb, such as sodium silicate, which does not carbonize or give off gases.

It should further be pointed out that in addition to the light rays and heat rays emitted by the incandescent bodies, the latter of which are minimized and the former of which are increased and transmitted with maximum efficiency by the invention of our said co-pending application, these bodies also emit particles or electrons of the matter of which the body is composed, especially when the bulbs are gas-filled. Here, again, if the surface of the inside of the bulb is smooth, the emitted particles, which for convenience we may call molecules, are reflected, and set up a continuous molecular bombardment of the incandescent body; whereas if the inside surface is roughened or frosted there is far less of this action, and a larger percentage of the molecules which would otherwise be reflected, are brought to a state of rest in a given interval of time.

When the stems are sealed into bulbs roughened on the inside and coated according to the present invention, we find that a clear ring forms around the neck of the lamp; which result may be termed as an incidental but very desirable one, in that it permits subsequent ready inspection of the inside labels and construction of each lamp.

In the accompanying drawing, which illustrates an incandescent lamp embodying my invention,

Figure 1 is a view partly in section and partly in elevation, of an incandescent lamp interiorly frosted and chemically coated on

the frosted surface, the film or coating being shown very much exaggerated;

Figure 2 is a sectional view on a larger scale, showing a fragment of the lamp bulb with its interiorly frosted surface and chemical coating; and

Figure 3 is a view similar to Figure 2, but with the frosted surface minus any added chemical coating.

Referring to the numerals on the drawing, the bulb of an incandescent lamp or the like, preferably initially of ordinary transparent glass, is indicated at 4, the interior frosted surface thereof is indicated at 5, and an added coating of beneficial chemicals is indicated at 6. The filament is shown at 7. For inspection purposes I may leave the interior surface of the bulb at the upper end thereof, indicated by the reference character 8, unfrosted and uncoated.

Variations may of course be resorted to within the scope of the following claim.

We claim:

An electrical appliance having a glass bulb, said bulb being frosted on the inside and coated over the frosted inside surface with a chemical, said chemical being applied as a thin film, and selected for its capacity to combine with roving deleterious substances within the bulb.

In testimony whereof we affix our signatures.

MAX ETTINGER.
CLEMENS A. LAISE.