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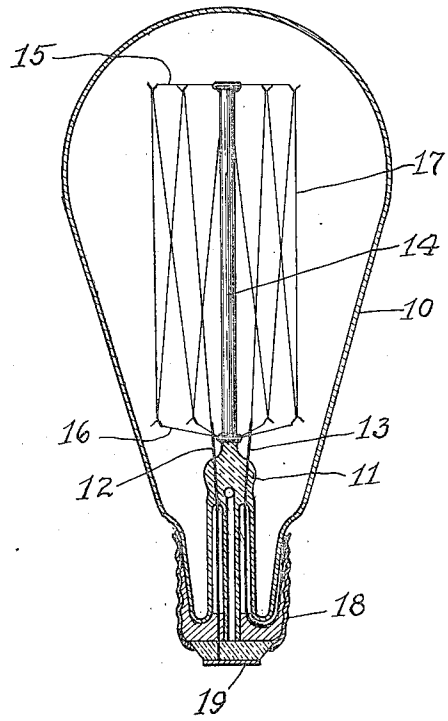
GENERATOR OF ULTRA VIOLET RAYS

Filed July 15, 1927



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UNITED STATES PATENT OFFICE

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GENERATOR OF ULTRA VIOLET RAYS

Application filed July 15, 1927. Serial No. 205,925.

My invention relate to an improved lamp or burner for producing ultra-violet rays and projecting them into the atmosphere so that the effect will be of the same kind as direct sunlight, although much less intense. My invention contemplates the use of my improved burner or lamp in much the same way that ordinary electric lights are used, to the end that when my burners or lamps are used in enclosed places, the effect on human beings in the rooms or buildings will be substantially the same as a mild degree of sunlight acting without modification or filtering action of any kind.

The beneficial effect of ultra-violent rays is well known, and explains in large measure the health-giving action of sunlight on human beings, under conditions where the sunlight may fall on them without being subjected to modification or change in any way. It is also well known that window glass commonly used, works a marked change on rays of sunlight, in that while the visible light rays readily pass through the glass, the beneficial ultra-violet rays are stopped by the glass and are practically excluded from interiors provided with glass windows. To this absence of ultra-violet rays in closed interiors may directly be traced many of the ills commonly experienced by those who are required to be shut in for long periods, and this applies alike to dwellings and factories where such conditions are found. An object of my present invention is to produce a lamp or burner of such a kind that it may be used with the ordinary electric lighting circuit and turned on periodically in the rooms of buildings where the undesirable conditions referred to obtain, to the end that the persons required to pass long periods in the rooms may have the beneficial effect of the ultra-violet rays of which they would otherwise be deprived, and thus the ills resulting from ultra-violet ray deficiency may be avoided.

I am aware that lamps or burners have been produced heretofore for generating ultra-violet rays and projecting them as desired against a patient being treated, but as far as I am aware, these burners have consisted of enclosed mercury vapor arc lamps developing an intense light giving off such powerful ultra-violet ray emissions as to be harmful if continued for more than the briefest intervals. For example in connection with such burners, an application of from one to ten minutes is all that the human body can stand without being burned. Burners of the type last referred to, must be provided with an envelope or enclosure that will not only permit the ultra-violet rays to pass through it, but that will be refractory enough to withstand the high temperatures produced, and as far as I am aware, the only material satisfactory for this purpose is pure quartz. While quartz is well adapted for this particular purpose, it is well known to those experienced in manipulating it, that it is very difficult to handle in making the envelopes or enclosures of such burners and that it does not lend itself at all to the making of most articles and shapes which are quite readily made from ordinary glass; for example it would be quite impossible to make containers or enclosures for incandescent electric lamps from quartz and even if it were possible, the great difficulty of manipulating the quartz would make the cost of such structures so high that their use would be prohibitive excepting possibly for special therapeutic treatments where a charge could be made for each treatment. By my invention I construct a low voltage electric lamp, resembling for example the ordinary incandescent lamp, the difference being that I have provided a means by which the glass enclosure or shell may be made of a glass of such composition as to be transparent to ultra-violet rays, or at least to such a large percentage of such rays that the light from the lamp will produce a distinctly beneficial effect on human beings on whom the rays may fall, due to the ultra-violet rays contained in the light. The advantage of this type of burner or lamp is that the quantity of light produced is much less than with the arc burner and the lamp may be left in operation for considerable intervals without harmful effects of any kind; in fact the action of such burners is of the same kind as mild direct sunlight.

In the description below, I refer to a special construction of incandescent electric lamp as an example of the embodiment of my invention. In doing this, it will be understood that I do not limit myself to the exact instrumentalities referred to, for I regard my invention broadly, as including any electric lamp having an evacuated container and therefore requiring that said container shall be transparent, in so far as such structure is not in the same class as mercury vapor or arc burners and in any such case where the container is transparent to ultra-violet rays to a substantial degree. In view of this, where reference in the description and claims is made to the filament of the electric lamp, such reference is to be understood as generic and to include any conductive means in the evacuated container for causing current flow therethrough and at the same time producing ultra-violet rays by other means than mercury vapor or arc discharge.

While I regard my invention in its generic aspect as above stated, from its practical aspect and to the end that its beneficial effect shall be as far reaching as possible, it is desirable that the lamp provided with my improved container, shall be applicable without extra devices to ordinary electric lighting circuits operating for example on 110 volts, so that my improved lamps may be interchangeable with ordinary incandescent electric lamps without requiring transformers or other devices to step up the voltage as required by mercury lamps and glow tubes whether gas filled or not.

My invention will best be understood by reference to the accompanying drawing showing a preferred embodiment thereof.

As shown in the drawing I construct an incandescent lamp by making an envelope or shell 10 of glass of special formula described below, so that the glass may be worked with sufficient ease to be formed without prohibitive expense to contain the incandescent filament and receive suitable electric terminals for connection with the electric circuit with which the lamp is to be used. In my improved construction, as in the construction of ordinary incandescent lamps, a central portion 11 of glass is provided near the base of the lamp, through which the connecting wires 12 and 13 enter the interior of the shell 10, these wires being sealed into the glass. The portion 11 is extended into a glass column 14 carrying the usual spreader wires 15 and 16 at its upper and lower ends to hold the filament 17 in desired position, the ends of the filament being connected with the wires 12 and 13. The filament 17 preferably consists of a fine wire of tungsten. The envelope or shell 10 makes air tight connection with the central portion 11, and the envelope is exhausted or evacuated to a high degree of vacuum to give a maximum length of life to the filament 17. The base of the shell 10 may carry metal terminals 18 and 19 in the form of a threaded sleeve and washer, connected with wires 13 and 12 respectively, to facilitate supplying the lamp with current from any desired supply circuit of electricity.

In making the envelope 10 I employ a glass much different from the ordinary lime and soda silicate from which incandescent bulbs are formed. I find that a glass consisting of the following constituents and in substantially the following percentages by weight will serve the purpose admirably; silica sand 55%, feldspar 25%, calcined potassium carbonate 10%, and bone ash 10%. While the particular percentages indicated, are preferable, some variation is permissible, for example the amount of silica sand may vary from 53 to 57%, the amount of feldspar from 23 to 27%, the amount of calcined potassium carbonate may vary from 8 to 12%, and the amount of bone ash may vary from 8 to 12%. This glass, while it has a melting temperature considerably higher than lime and soda silicate glass, is, when fused, of substantial ductility, and is melted with sufficient readiness so that it may be worked without prohibitive effort, and bulbs or envelopes may be made of it for the purpose referred to in the general manner employed in the manufacture of such bulbs from lime and soda silicate glass. A critical point in manipulating my improved glass to construct bulbs or envelopes as described, is that the thickness of glass employed shall be materially greater than the thickness of glass ordinarily used for that purpose, for example about twice as thick, and when this is done, the construction of such bulbs or envelopes from the special glass described, is entirely feasible. The special glass described has the property, not possessed by ordinary window glass or the glass of incandescent bulbs, of permitting the passage through it of such a large percentage of the ultra-violet rays produced by the light source, that these rays exert a distinctly beneficial effect on the health of human beings subject to the rays for appreciable intervals each day. My improved burner or lamp thus affords a means for supplying to working people in factories, and others who are required to be habitually indoors, a large measure of health and enjoyment of which they otherwise would be deprived.

While I have described the light source as conveniently being a filament heated incandescent by electric current flow, the particular light source involved does not constitute a part of my present invention, which, on the other hand, as far as the lamp is concerned, includes any light source requiring a

container to protect the light source, the characteristics of which light source permit the container to be readily fusible instead of requiring it to be refractory, as in mercury arc lamps, which container besides being readily fusible, is transparent to ultra violet rays to a substantial degree.

In the description and claims where the composition of the glass is referred to, it will be understood that this is the composition of the mix or batch before melting the same to make the glass.

While I have shown my invention in the particular embodiment above described, it will be understood that I do not limit myself to this exact construction as I may employ equivalents known to the art at the time of the filing of this application without departing from the scope of the appended claims.

What I claim is:

1. Glass for making incandescent lamp bulbs which are transparent to ultra-violet rays, consisting by weight of from 53% to 57% of silica sand, from 23% to 27% of feldspar, from 8% to 12% of calcined potassium carbonate, and from 8% to 12% of bone ash.

2. Glass for making incandescent lamp bulbs which are transparent to ultra-violet rays, consisting of silica sand, feldspar, calcined potassium carbonate, and bone ash.

In witness whereof, I have hereunto subscribed my name this 11th day of July, A. D. 1927.

HERBERT W. WELD.