UNITED STATES PATENT OFFICE.

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INCANDESCENT MANTLE.

943,488. Specification of Letters Patent. Patented Dec. 14, 1909.

No Drawing. Application filed March 18, 1907. Serial No. 363,055.

To all whom it may concern:

Be it known that I, THOMAS TERRELL, a subject of the King of England, and residing in London, England, have invented certain new and useful Improvements in Incandescent Mantles, of which the following is a specification.

This invention relates to improvements in the manufacture of incandescent mantles.

Hitherto before selling incandescent mantles to the users, it has been customary to incinerate the mantles (*i. e.* to burn out the organic tissue, such as cotton, therefrom) and having thus produced a fragile skeleton of illuminating oxids, the mantle has been coated with collodion for the purpose of strengthening the burned off mantle.

The object of this invention is to produce a mantle which may be sold in the unburned state (*i. e.* with the organic tissue still contained therein), and so manufactured and prepared that the purchaser can apply the mantle to an ordinary gas burner and incinerate it *in situ*.

In producing a mantle which can be incinerated on an ordinary gas burner, it is essential that the mantle shall not shrink very much on burning off and shall produce a very cohesive, tough and strong mantle when incinerated. Secondly it is essential that the unburned mantle as supplied to the user shall be inflammable, that is that it shall be capable of incinerating itself when a lighted match is applied to it, and further it is essential that the shape or form of the mantle and its stitches shall be fixed before burning off in order that the proper shape of the finished mantle may be effectively insured.

To this end the invention broadly consists in producing an unburned mantle containing a high proportion of oxids of the illuminating metals, setting the stitches of the mantle after impregnation, and coating the mantle with a combustible oxygen-yielding inflammable stiffening substance such as collodion, so that the mantle can be sold to the user in the soft form ready for incineration on the ordinary burner.

A process of producing unburned mantles or fabric containing the necessary high proportion of oxids of the illuminating metals in such a condition as will yield a cohesive and tough mantle is as follows:—Very fine threads of cotton, ramie or other natural cellulose are soaked in a concentrated solution of salts of the illuminating metals (nitrates of thorium and cerium) until the solution has thoroughly permeated the fiber, and until the fabric contains the nitrates to an amount equivalent to a very high percentage, namely, more than 30% of oxids of the illuminating metals.

In order to effect a proper absorption of the illuminating salts the natural cellulose may be hydrated, for example mercerized cotton may be employed. The solution is then removed from the fiber by mechanical means and the fibers are then rendered perfectly dry by drying in stoves at a low temperature. The fabric is subsequently immersed in a concentrated solution of ammonia and is then washed in distilled water and dried when it is ready for spinning or knitting. By the process of drying and treating with ammonia the oxids of the illuminating metals are formed in the fibers in very high proportion, but in such a form that no microscopic examination can disclose any separate inorganic particles.

Any other process resulting in an unburned mantle consisting of cellulose combined with the necessary high proportions of the hydrated oxids of thorium and cerium would be suitable for the purpose of this invention.

The fabric is knitted either before or after impregnation. The knitted and impregnated fabric is then immersed in hot water or is steamed with the object of setting the stitches. The fabric is next cut into suitable lengths according to the shape and size of the mantles required. The heads are then sewn in and a strengthening fluid may be applied to the top. The mantles are now coated with a ready inflammable stiffening substance, for example they may be dipped in a solution of collodion. The best form of collodion for the purpose is produced by mixing trinitro-cellulose with nitro-glycerin and dissolving these in a mixture of ether and acetone. The mantle is next partially dried until it is almost completely dry and is then placed on a hot former (preferably heated internally by steam) of a diameter suitable to the diameter of the burner top on which the mantle is subsequently to be used.

A mantle properly made by my process cited above shrinks on incineration about 35% in length and 35% in diameter, so that the unburned mantle should be made about 55% longer and broader than the mantle re-

quired after burning. Thus in producing mantles for an ordinary burner having a burner top of one inch diameter, the former upon which the mantles are formed as described above, should be slightly over one and a half inches in diameter, say one and five-eighths inches.

The hot former will completely dry and set the collodion and will fix the threads of the mantle in their position so that the mantle can be folded and packed without risk of injury or disturbance or change in size or shape.

When it is desired to use the mantle it is placed on an ordinary burner in the usual way, and of course it is much too large. As it is necessary to insure uniform incineration a light is now applied to the top of the mantle, when the collodion will rapidly catch fire and burn downward completely around the mantle. The organic matter is thus burned out of the mantle and when the mantle is burned to the bottom it will have shrunk nearly to its final dimensions. The gas is then turned on low and lighted so as to burn off any residual carbonaceous matter, which takes a few seconds, and when this is accomplished the gas may be turned on full when the incinerated mantle acts in the usual way.

This process is equally applicable to the manufacture of inverted incandescent mantles and the user in burning off such mantles merely ignites them at the top, after which the gas may be turned on and the mantle used in the ordinary way.

What I claim as my invention and desire to secure by Letters Patent is:—

1. The process of manufacturing a soft incandescent mantle which contains the organic fabric but which can be incinerated on an ordinary burner, consisting in producing a mantle containing the original organic fabric impregnated with a high proportion of oxids of illuminating metals and coating the same with an inflammable oxygen-yielding stiffening substance.

2. The process of manufacturing a soft incandescent mantle which contains the organic fabric but which can be incinerated on an ordinary burner, consisting in producing a mantle containing the original organic fabric impregnated with a high proportion of oxids of illuminating metals, coating the same with an inflammable oxygen-yielding stiffening substance and shaping the mantle on a heated former.

3. The process of manufacturing a soft incandescent mantle which contains the organic fabric but which can be incinerated on an ordinary burner, consisting in soaking fibers of natural cellulose in a concentrated solution of salts of the illuminating metals, drying the fibers, immersing them in a concentrated solution of ammonia to transform the salts into hydrated oxids, washing out the ammonia, drying the fibers, forming a mantle therefrom, coating the mantle with an inflammable oxygen-yielding stiffening substance and shaping the mantle on a heated former.

4. The process of manufacturing a soft incandescent mantle which contains the organic fabric but which can be incinerated on an ordinary burner, consisting in mercerizing fibers of natural cellulose, soaking them in a concentrated solution of salts of the illuminating metals, drying the fibers, immersing them in a concentrated solution of ammonia, washing out the ammonia salts, drying the fibers, forming a mantle therefrom, coating the mantle with an inflammable oxygen-yielding stiffening substance, and shaping the mantle on a heated former.

5. The process of manufacturing a soft incandescent mantle which contains the organic fabric but which can be incinerated on an ordinary burner, consisting in producing a mantle containing the original organic fabric impregnated with a high proportion of oxids of illuminating metals, and coating the same with collodion.

6. The process of manufacturing a soft incandescent mantle which contains the organic fabric but which can be incinerated on an ordinary burner, consisting in producing a mantle containing the original organic fabric impregnated with a high proportion of oxids of illuminating metals, coating the same with collodion, and shaping the mantle on a heated former.

7. The process of manufacturing a soft incandescent mantle which contains the organic fabric but which can be incinerated on an ordinary burner, consisting in soaking fibers of natural cellulose in a concentrated solution of salts of the illuminating metals, drying the fibers, immersing them in a concentrated solution of ammonia to transform the salts into hydrated oxids, washing out the ammonia, drying the fibers, forming a mantle therefrom, coating the same with collodion, and shaping the mantle on a heated former.

8. The process of manufacturing a soft incandescent mantle which contains the organic fabric but which can be incinerated on an ordinary burner, consisting in mercerizing fibers of natural cellulose, soaking them in a concentrated solution of salts of the illuminating metals, drying the fibers, immersing them in a concentrated solution of ammonia, washing out the ammonia salts, drying the fibers, forming a mantle therefrom, coating the same with collodion, and shaping the mantle on a heated former.

9. The process of manufacturing mantles which consists in producing an unburned mantle containing a high proportion of oxids of the illuminating metals, setting the

stitches of the mantle after impregnation; in coating the mantle with a combustible oxygen-yielding inflammable stiffening substance whereby the mantle is retained in the soft form until incineration on the ordinary burner.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

THOMAS TERRELL.

Witnesses:
JOHN P. H. SOPER,
HERBERT BURRAGE.