

UNITED STATES PATENT OFFICE.

LOUIS HICKS, OF NEW YORK, N. Y.

MANUFACTURE OF INCANDESCENT MANTLES.

SPECIFICATION forming part of Letters Patent No. 641,698, dated January 23, 1900.

Application filed September 18, 1899. Serial No. 730,892. (No specimens.)

To all whom it may concern:

Be it known that I, LOUIS HICKS, a citizen of the United States, residing in the borough of Manhattan, city, county, and State of New York, have invented a new and useful Improvement in the Manufacture of Incandescent Mantles, known generally as the "Welsbach" Mantle, of which the following is a specification.

As is well known, the incandescent device, mantle, or hood known as the "Welsbach" mantle is made of light network fabric or threads, such as cotton, which after being impregnated with a solution of the salts of the earthy oxids of rarer metals is exposed to the heat of a flame. The material of the fabric, generally cotton, is soon consumed, leaving a skeleton hood or frame consisting of the incombustible and infusible products of the salts that were employed for impregnating the fabric. The device, hood, or mantle thus produced is exceedingly light and fragile, since it consists of the oxids of the rarer metals cohering and reproducing the network of the original cotton fabric. In order to protect the fabric of the fragile completed mantle while in use and to increase its powers as a light-giving substance, it has been proposed to dip the fragile completed mantle into a concentrated solution of the original impregnating-salts, so as to provide the mantle with a fresh layer of the metallic salts, which becomes fully oxidized soon after the fabric has become incandescent. The difficulty with such a strengthening treatment of the mantle is that the fresh layer of the metallic salts so provided does not fill the interstices of the network of the fabric of the mantle, but merely coats the threads forming the network of the fabric, leaving the mantle still consisting of a network of interwoven threads of the oxids of the rarer metals and not materially strengthened or protected. Moreover, the metallic salts of the metals used in making the concentrated solution into which the fragile completed mantle is dipped for the purpose of providing a fresh layer until oxidized readily absorb moisture from the air, thus making the mantle soft and heavy and subjecting it to a severe strain.

I have discovered that if the interstices of the network of the fabric of the completed

mantle are partially or wholly filled by means of a fresh layer of the metallic salts, which is spread between the threads forming the network of the fabric of the mantle and which becomes fully oxidized soon after the fabric has become incandescent, the mantle is much better protected and strengthened, and by reason of the continuous surface resulting from the filling of the interstices by spreading between the threads forming the network of the fabric of the mantle the fresh layer, which is delicate and thin and capable, therefore, of a high degree of incandescence, the light-giving power of the mantle is materially increased.

I have discovered that in order properly to fill the interstices of the network of the fabric of the fragile completed or calcined mantle with the fresh layer of the metallic salts a treatment of the fragile completed or calcined mantle analogous to the method by which the fragile completed mantle is made can be used. Instead, however, of impregnating a cotton fabric with a solution of the metallic salts it is necessary, first, to impregnate the cotton held in solution with a solution of the metallic salts. The impregnation of the cotton in solution may be performed by dissolving pyroxylin in two parts of acetone and one part of alcohol or other suitable or similar solvent or solvents, using no greater quantity of pyroxylin than can be readily dissolved by the solvent, and then adding to the solution of pyroxylin a concentrated or saturated solution of nitrate of thorium or of nitrate of thorium with a small percentage of cerium or other suitable metallic salt or salts in water, using a quantity of the concentrated or saturated solution of the metallic salts in water sufficient to cause the pyroxylin held in solution to begin to be precipitated by the solvent (water) of the saturated solution and determined more particularly, as hereinafter described. I have found in practice that the weight of the concentrated or saturated solution of the metallic salts about equals the weight of the pyroxylin used.

In order to provide the fragile completed mantle with a fresh layer of the pyroxylin impregnated with the solution of the metallic salts, the mantle is dipped into the impregnated solution of pyroxylin and is then with-

drawn and allowed to dry. Upon the drying of the mantle it is found that the impregnated pyroxylin has filled the interstices of the mantle. Since the pyroxylin is not a textile fabric, it distributes the metallic salts continuously between the threads of the network of the fabric. The pyroxylin also protects the metallic salts against the moisture of the atmosphere and prevents the mantle from becoming moist and heavy in case it is not to be used immediately. When the mantle is heated anew to incandescence, the small quantity of pyroxylin is consumed and the metallic salts of the fresh layer become fully oxidized soon after the fabric of the original fragile completed mantle has become incandescent. If the mantle be now examined and handled, it will be found that the interstices of the network of the fabric have been partially or wholly filled with the oxids of the rarer metals, that the mantle presents in consequence a surface which is more continuous, that the strength, resistance, and durability of the mantle has been greatly increased, and that the light-giving power of the mantle has also been increased in a marked degree.

The precipitation of the pyroxylin, which takes place upon the addition of the concentrated solution of the metallic salts, is caused by the water. It is necessary for the successful employment of the process described that the quantity of water added be carefully determined. Otherwise the interstices of the network of the fabric of the fragile completed or calcined mantle will not be filled with the pyroxylin impregnated with the metallic salts, and in consequence the interstices of the fragile completed or calcined mantle will not be filled with the oxid of the metallic salts after the mantle is heated anew to incandescence and the small quantity of pyroxylin is consumed. A very delicate adjustment of the quantity of water added with the concentrated solution of the metallic salts can be had as follows: The solution of pyroxylin or soluble cotton is divided into two equal parts. To one of such equal parts a quantity of the concentrated solution of the metallic salts in water is added until a permanent precipitate of the pyroxylin or soluble cotton is obtained. The entire quantity of water to be used in the process is thus properly adjusted and determined, and the remaining equal part of the solution of pyroxylin or soluble cotton should be now added to the equal part to which the concentrated solution of the metallic salts in water has been added. The function of the

water is essential to the process described and is as follows: After the fragile completed mantle has been dipped into the impregnated solution of pyroxylin and has been withdrawn the solvent or solvents used to dissolve the pyroxylin evaporate more readily than the water, thus increasing the relative percentage of water left in the solution remaining upon the mantle. As the solvent or solvents evaporate a point is reached when the percentage of water remaining is sufficient to throw the pyroxylin out of solution in the solvent or solvents remaining and into a spongy amorphous mass impregnated with the metallic salts and filling perfectly the interstices of the network of the fabric of the fragile completed or calcined mantle. Should too large a quantity of water be added, the pyroxylin or soluble cotton would be entirely precipitated, and the solution would be unavailable in the process described. Should too small a quantity of water be added, the desired result could not be obtained, since the pyroxylin or soluble cotton would not upon the evaporation of the solvent or solvents be thrown out of solution, as above described, into a spongy mass, causing the interstices of the completed mantle to be filled with the pyroxylin impregnated with the metallic salts, and since in consequence the interstices of the completed mantle would not be filled with the oxid of the metallic salts when the mantle is heated anew to incandescence and the small quantity of pyroxylin is consumed.

What I claim as my invention, and desire to secure by Letters Patent of the United States, is—

The herein-described method of spreading between the threads forming the network of the fabric of a completed mantle for incandescent gas-light, a layer of pyroxylin impregnated with a quantity of a salt or salts, suitable for the making of the mantle, sufficient to leave a layer of the oxid of the metal of the salts spread between the threads when the mantle is heated to incandescence and the pyroxylin is consumed, substantially as, and for the purposes, described.

In witness whereof I have signed my name to this specification, in the presence of two subscribing witnesses, on this 16th day of September, 1899.

LOUIS HICKS.

Witnesses:

GRACE GRIMMOND,
HUGH D. McGRANE.