

# UNITED STATES PATENT OFFICE.

FREDERICK L. RAWSON AND WILLIAM STEPNEY RAWSON, OF LONDON,  
ENGLAND.

## PRODUCTION OF INCANDESCENT MANTLES.

SPECIFICATION forming part of Letters Patent No. 407,963, dated July 30, 1889.

Application filed August 21, 1888. Serial No. 283,360. (No model.) Patented in England September 1, 1886, No. 11,161; in Germany July 24, 1887, No. 43,012, and in France November 2, 1887, No. 186,722.

*To all whom it may concern:*

Be it known that we, FREDERICK LAWRENCE RAWSON and WILLIAM STEPNEY RAWSON, both subjects of the Queen of England, residing at London, England, have invented certain new and useful Improvements in the Production of Incandescent Mantles, of which the following is a specification, and for which we have secured Letters Patent in Great Britain, No. 11,161, dated September 1, 1886; in Germany, No. 43,012, dated July 24, 1887, and in France, No. 186,722, dated November 2, 1887.

This invention relates to improvements in the manufacture of mantles connected with the production of light by means of incandescence of refractory materials, known as the "Welsbach incandescent light;" and the object of our improvement is to render these mantles after ignition sufficiently hard and resistant to allow of packing and handling without fear of breakage in the transport.

It is found that it is of the utmost importance that the mantles, which are to be rendered incandescent by the Bunsen burner, should be as regular as possible in their contour and also should be of slightly conical shape, so as to allow the flame to play evenly upon their surface. This is effected by stretching the mantles, which are composed of a knitted fabric impregnated with a solution of the earthy oxides, upon a platinum mandrel previous to ignition, and after lighting them from above and allowing them to smolder down slowly we play a blow-pipe flame upon them with gradually-increasing force, so as to compel them to take the exact shape of the mandrel, which may be previously molded to any desired form. By these means the mantles are also raised to their full efficiency at once, which would otherwise require four or five hours' burning over the usual Bunsen flame. The mantles having thus been given their proper shape at a higher temperature than they will afterward be raised to are less likely to lose their shape, and therefore their efficiency. The platinum foil of the mandrel should be of just sufficient thickness to keep its shape, which can always

be renewed by smoothing out upon a former. 50  
The heat of the blow-pipe will in this way be more easily kept up and not lost by the cooling of the metal. The mantles may be stretched and treated upon the mandrel either before or after they are attached to the upright which supports them in the finished lamp. Difficulty has been found heretofore in the transport of these mantles without breakage, and various methods have been proposed. This difficulty our invention is designed to overcome by dipping the mantles, after they have been given their proper shape, into a liquid which will thoroughly penetrate the pores of the material and will afterward set to such a degree of hardness as to protect the material from danger of breakage in packing or handling, and which can afterward be removed without mechanical injury to the mantles or without leaving any objectionable residue. 60 70

We have found that a very satisfactory method of carrying out our invention consists in dipping the cone into a hot solution of volatile hydrocarbon—such as benzine—mixed with paraffine-wax or paraffine alone. 75  
By these means the mantle is covered with a thin coating of wax, which becomes sufficiently hard on cooling to allow of packing and handling without fear of breakage. The paraffine is capable of burning away without any residue except carbon, which will always be burned completely away by the flame of the Bunsen burner. When a hydrocarbon is used, it is merely for the purpose of dissolving the paraffine, and it is used in a sufficient quantity to form a liquid solution which will evaporate and leave the mantle coated with paraffine. It is quite easy to ignite the mantle from the top previous to placing it in position over the burner and allowing it to burn down, which it does somewhat after the fashion of a candle and leaves no residue prejudicial to the light-giving properties of the mantles. We find the following a suitable plan for combining the paraffine with the mantle: 85 90  
The paraffine is kept at a suitable temperature in a glass cylinder resting in a metal cylinder closely fitting it and containing oil,



which can be raised to high temperature without giving off vapor. The mantle is then dipped into paraffine, and being slowly withdrawn the greater part of the paraffine runs off, and the only part holding an excess is the lower edge. This excess is best removed by wiping with a warm piece of glass, down which the paraffine will run. While the lower edge is still pliable, and before the paraffine has hardened, we find it advisable to give the requisite shape to the mantle by carefully molding it over the rounded end of a glass test-tube of the right dimensions. Thus the mantle assumes a perfectly-rounded shape when the paraffine sets hard, and quite sufficient paraffine remains in the pores of the netting to protect it from injury.

Other materials may be employed as long as they set hard at ordinary temperatures and burn away without mechanical destruction to the mantle and without leaving any residue which would injure the light-giving properties of the mantle.

The materials referred to as being capable of use in lieu of paraffine may be any solid hydrocarbon of a high boiling-point and many resins and gums soluble in spirit, such as alcohol, &c. Shellac will serve the same purpose, but not quite as advantageously.

The impregnation with paraffine also serves to protect the mantle from dust, which is of great harm to it, for the dust which may adhere to the paraffine-wax is entirely carried away when the paraffine is burned.

What we claim is—

1. The herein-described improvement in strengthening incandescent mantles, consisting in coating the completed mantle with paraffine or other suitable material, substantially as set forth.

2. In the manufacture of incandescent mantles, the method of forming said mantles, which consists of first stretching the impregnated knitted mantle upon a mandrel, then burning the mantle, then shaping the mantle against the mandrel by means of a blow-pipe flame, and finally coating the mantle with paraffine or other similar material, substantially as set forth.

In testimony that we claim the foregoing as our invention we have signed our names, in presence of two witnesses, this 3d day of August, 1888.

F. L. RAWSON.

W. STEPNEY RAWSON.

Witnesses:

ALFRED STEVENS,  
O. DANNENBERG.