

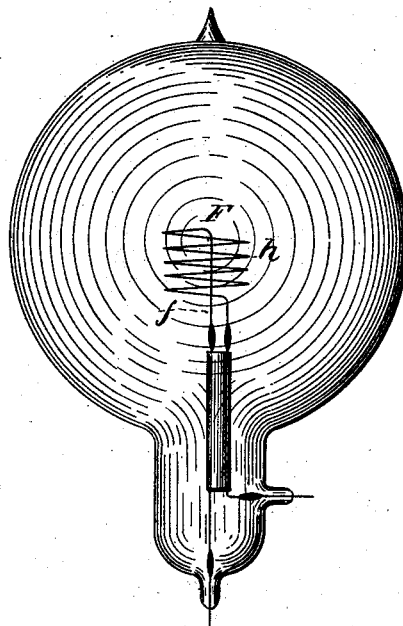
(No Model.)

G. W. HICKMAN & J. F. MCCOY.

INCANDESCENT FILAMENT FOR ELECTRIC LAMPS.

No. 302,134.

Patented July 15, 1884.



WITNESSES

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# UNITED STATES PATENT OFFICE.

GEORGE W. HICKMAN, OF WASHINGTON, D. C., AND JOSEPH F. MCCOY, OF  
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## INCANDESCENT FILAMENT FOR ELECTRIC LAMPS.

SPECIFICATION forming part of Letters Patent No. 302,134, dated July 15, 1884.

Application filed November 7, 1883. (No model.)

### *To all whom it may concern:*

Be it known that we, GEO. W. HICKMAN, of Washington, District of Columbia, and JOSEPH F. MCCOY, of Rahway, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Carbon Filaments for Electric Lamps; and we do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings and to the letters of reference marked thereon, which form part of this specification.

Our invention relates to an improvement in incandescing carbon filaments and the mode of manufacturing the same, the object of the improvement being to produce a very durable and flexible carbon filament, which may receive and retain any desired shape, and have sufficient strength to maintain itself intact in any position and under any jarring or vibration to which a lamp is liable to be subjected while in use, either stationary or upon vehicles or vessels of travel.

Although by the carbonization of various substances—such as paper, parchment, hair, silk and cotton threads, fibers of hemp, bamboo, and others—incandescing filaments have been obtained having proper electrical qualities combined with sufficient strength for use in stationary lamps, and in shapes not involving a very great extent or length of filament between its end supports, there is still a desire to obtain a carbon filament which will endure the strains incident to travel, and which may be given graceful shapes and sufficient length to give extensive illumination without requiring multiplication of filaments in a single lamp, and consequent weakening of the electric current by division.

In our experiments, with a view to the production of a carbon filament having the desired qualities, as stated, we have found that the woody fiber of the stems of the dock-weed, when properly treated, yields a carbon which seems to leave nothing to be desired in this line. In treating these stems we remove the

bark and pith, and cut the wood first into proper length, and then split it into narrow pieces, which we shave down to the desired size, which may reach even to the small diameter of a fine hair with a length of several inches, so great is the toughness of the fiber. The pieces thus prepared we steep in dilute alcohol, (say equal quantities of proof-spirit and water,) and find that a wonderful change in their condition is thus caused, the fiber becoming so pliable that it may be wound or coiled into greatly-involved shapes with ease and safety from breakage. While the fiber is thus pliable we give it the desired shape, preferably by bending it about a refractory mold, and after securing the ends we dip the mold and fiber into melted pure paraffine, and then place them into a crucible and subject the same to the necessary heat for carbonizing the fiber. It seems that the paraffine causes a kind of concentration in the mass of fiber while carbonization is progressing, and replaces in the pores all expelled volatile matters, so that a compact, strong, and resilient filament of carbon is the result.

In the drawing is shown an incandescent electric lamp having an incandescing carbon filament prepared according to our invention. The filament *F* has a central stem, *f*, about which is coiled a helix, *h*, connected to the stem integrally, one end of the helix and one end of the central stem being attached to the leading-in wires. We believe that such a shape could not be given to a carbon filament made by any other process and from any other substance heretofore used, the diameter being sufficiently small to oppose a proper resistance to the current, and the strength after carbonization being such that the filament will support itself in all positions and resist all strains from jarring to which a lamp is ever likely to be subjected.

The fiber of the dock-weed stem contains gum, resin, sugar, starch, and oil, all of which are soluble, or partly soluble, in alcohol; and it would appear that any vegetable stem having these substances in its woody fiber will, with similar treatment, give a carbon filament

similar to that obtained from the dock-stem, provided, of course, that the other conditions of similarity, known or unknown, are the same, and that adverse substances do not accompany those named.

What we claim is—

The herein-described mode of treating vegetable fiber for producing incandescing filaments, the same consisting in first steeping the fiber in alcohol, next bending or forming it into the desired shape, then dipping in par-

affine, and finally carbonizing, substantially as set forth.

In testimony that we claim the foregoing as our own we affix our signatures in presence of two witnesses.

GEO. W. HICKMAN.  
JOSEPH F. MCCOY.

Witnesses:

B. F. MORSELL,  
EDWARD E. ELLIS.