

UNITED STATES PATENT OFFICE.

ALBERT L. MARSH, OF DETROIT, MICHIGAN, ASSIGNOR TO HOSKINS MANUFACTURING COMPANY, OF DETROIT, MICHIGAN, A CORPORATION OF MICHIGAN.

ELECTRICAL RESISTANCE ELEMENT.

1,057,754.

Specification of Letters Patent.

Patented Apr. 1, 1913.

No Drawing.

Application filed September 30, 1912. Serial No. 723,194.

To all whom it may concern:

Be it known that I, ALBERT L. MARSH, a citizen of the United States, residing at Detroit, in the county of Wayne and State of Michigan, have invented a new and useful Improvement in Electrical Resistance Elements, of which the following is a specification.

My invention consists in a novel resistance element adapted for general use for which articles of the class are intended, and more especially suited for use in heating appliances. For this purpose, it is well known that the principal requirement is durability, and the resistivity should be high enough to enable the requisite heat to be developed in the space afforded in commercial appliances. The durability of a wire of a resistance element maintained at a high temperature by internally developed heat caused by the passage of an electric current depends upon a very large number of factors and can be determined only by test.

In my Patent No. 811,859, wherein I describe a resistance element of nickel and chromium, and mention as desirable, nickel chromium alloys with the chromium in the percentages of 10 and 15, I also stated that iron was not suitable for my purpose, and in working with iron as a substitute for nickel in the proportions therein mentioned, the facts are as stated therein. I have since discovered, however, that there is a somewhat sharp change in the durability of the alloy when the chromium is used in high percentages, as from 20 per cent. upward, and when 25 per cent. chromium is used, the alloy is extremely durable, although it is a trifle less durable than the exceedingly resistant nickel chromium alloy therein described. However, for use at low temperatures, say at 800° C., and particularly where the element is to be used in large quantities and price is a consideration, the iron chromium composition is very desirable. It has a re-

sistivity of approximately 56 microhms per centimeter cube, which is sufficiently high for most uses.

The resistance element of the composition above mentioned can, when suitable materials are used, be drawn into wire form as high as 35 per cent. chromium, as far as I know now, but with the rapid advance of rolling methods, and the possibility of obtaining purer metals, much higher proportions may be drawn in the future. Resistance elements containing from 20 to 35 per cent. chromium are generally uniform in character but with slightly greater life and slightly higher resistivity as the chromium increases, and it is not to be anticipated that a further increase of chromium within any limits which may be found workable in the future, will materially change the properties. Manifestly, still greater proportions of chromium might be used if cast grids or the like were used.

It will be understood, of course, that while I have described my invention in its preferred form accurately, I do not intend to limit myself thereto except as pointed out in the claim, and it will also be understood that various other materials may be added to the resistance elements specified without materially injuring them. Manganese will ordinarily be used as a deoxidizer and the use of a slight excess slightly increases the resistivity without materially injuring the element.

I claim as new and desire to secure by Letters Patent—

A resistance element adapted to withstand a high temperature formed of an iron chromium alloy in which the chromium is at least 20 per cent.

ALBERT L. MARSH.

In presence of—

J. G. ANDERSON,
J. LANDESMAN.