

UNITED STATES PATENT OFFICE.

ROBERT ABBOTT HADFIELD, OF SHEFFIELD, ENGLAND.

METHOD OF MAKING MAGNETIC MATERIALS.

1,014,218.

No Drawing.

Specification of Letters Patent.

Patented Jan. 9, 1912.

Application filed March 21, 1907. Serial No. 363,658.

To all whom it may concern:

Be it known that I, ROBERT ABBOTT HADFIELD, a subject of the King of Great Britain, of Sheffield, England, have invented a certain new and useful Improvement in Methods of Making Magnetic Materials, of which the following is a specification.

In U. S. Letters Patent No. 767,110 granted to me August 9, 1904, I have described and claimed a method of making magnetic material, which consists in rolling an alloy of iron combined with other elements, (more particularly, silicon aluminium or phosphorus) into thin sheets, and then subjecting said rolled sheets to a heat treatment, whereby said sheets are first heated to a temperature below the melting point, allowed to cool, reheated to a temperature above that first employed, and then finally cooled. As the magnetic material referred to (and especially the alloy or alloys above mentioned) is cold-short, the rolling or forging of the alloy into thin sheets, as set forth in my patent aforesaid, necessarily implies a preliminary heating of said alloy to a high temperature in order to enable it to be thus mechanically treated.

My present invention differs from that claimed in my Letters Patent aforesaid in that, first, instead of initially subjecting the rolled or wrought thin sheet to a temperature below that subsequently employed I subject it to one higher than that subsequently employed: and, second, after the first heating the material is cooled slowly and after the second heating it is cooled rapidly.

In carrying out my present process after initially heating and rolling the body into a sheet, I heat the said body to a relatively high temperature below the melting point, say between 900° and 1000° centigrade then cool it slowly, then heat to a lower temperature, say between 700° and 800° centigrade and then cool it rapidly.

Cooling rapidly, as herein referred to, means cooling at such a rate as that the changes effected by raising the material to the definite temperature stated are retained substantially unaltered.

Cooling slowly, as herein referred to, means cooling at such a rate as to permit the slow rearrangement of the molecules with reference to one another so that the condition of strain or hardness is removed and the material becomes soft, often accompanied by a more uniform distribution of the elements throughout the mass.

I claim:

1. The herein described method of producing a magnetic material of high permeability and low hysteresis action, which consists in alloying a magnetic substance with silicon, reducing the alloy to a thin body, heating said body to a relatively high temperature below its melting point, cooling said body slowly, reheating it to a temperature below that first employed and cooling said body rapidly.

2. The herein described process of producing a magnetic material of high permeability and low hysteresis action, which consists in suitably alloying iron with silicon, aluminium, or phosphorus, rolling the alloy into thin sheets, heating said body to a temperature of from about 900° C. to about 1000° C. then cooling said body slowly, then reheating the body to a temperature from about 700° C. to about 800° C. and then cooling said body more rapidly than the first cooling.

In testimony whereof, I have signed my name hereto in the presence of two witnesses.

ROBERT ABBOTT HADFIELD.

Witnesses:

WILLIAM CROSS,
JOHN WM. CRAWLEY.