UNITED STATES PATENT OFFICE.

ROBERT A. HADFIELD, OF SHEFFIELD, ENGLAND.

PROCESS OF IMPROVING CERTAIN MAGNETIC QUALITIES OF A MAGNETIC BODY.

1,012,845. Specification of Letters Patent. Patented Dec. 26, 1911.

No Drawing. Application filed February 27, 1906, Serial No. 303,150. Renewed May 6, 1910. Serial No. 559,823.

To all whom it may concern:

Be it known that I, ROBERT A. HADFIELD, a subject of the King of Great Britain, residing at Parkhead, Sheffield, England, have invented a certain new and useful Improvement in Processes for Improving Certain Magnetic Qualities of a Magnetic Body, of which the following is a specification.

The invention is a process for improving certain magnetic qualities of a magnetic body containing iron.

I have discovered that the permeability may be increased and the hysteresis action reduced of a magnetic body containing iron and low in carbon, by heating said body to a point within bounds known as the "gamma" range of temperature which brings about a certain condition or structure of the iron present, and then cooling the same preferably slowly. This heating and cooling may be effected in any suitable way. By gamma range of temperature is meant that range of temperature existing above the third critical point most definitely shown in ordinary carbon steels when heated. A diagram accurately illustrating this point is given by Messrs. Arnold and McWilliam in their paper on the thermal transformations of carbon steels published in the *Journal of the Iron and Steel Institute* 1905, Vol. 2. Diagram 2 in this paper shows the critical point for a certain carbon steel at about 870° centigrade. The variations from this temperature for varying carbon contents are discussed in other portions of the same paper. It is to be pointed out that the presence of constitutents other than carbon, also influence the lower limit of temperature of the gamma state. There can be no ambiguity as to the meaning of the term above defined, since it is widely used in contemporaneous metallurgical literature.

In U. S. Letters Patent No. 836,754, granted to me November 27, 1906, I have set forth an alloy of iron and silicon, which is one specific magnetic body within the present disclosure, treated by heating to a point within the "gamma" range as herein set forth. In U. S. Letters Patent No. 836,497, granted to me November 20, 1906, I have set forth an iron-silicon-aluminum alloy, which is another specific magnetic body, similarly treated, and in U. S. Letters Patent No. 837,682, granted to me December 4, 1906, I have described still another such specific magnetic body, namely, an iron-silicon-manganese alloy treated in like manner.

I claim:

1. The herein described process of increasing the permeability and resistance and decreasing the hysteresis action of a magnetic body, which consists in heating said body to a point within bounds known as the "gamma" range and then cooling.

2. The herein described process of increasing the permeability and resistance and reducing the hysteresis action of a magnetic body containing iron and being low in carbon, which consists in heating the body to a point within bounds known as the "gamma" range and then slowly cooling.

3. The herein described process of increasing the permeability and reducing the hysteresis action of a magnetic body containing iron and being low in carbon, which consists in heating the body to a point within bounds known as the "gamma" range and then cooling, substantially as described.

In testimony whereof I have affixed my signature in presence of two witnesses.

ROBERT A. HADFIELD.

Witnesses:
G. H. HEMSOLL,
E. RODGERS.