Patented Dec. 14, 1943

2,336,617

UNITED STATES PATENT OFFICE

2,336,617

HEAT TREATING ELECTRICAL SILICON STEEL

John Johnston, Short Hills, N. J., assignor to United States Steel Corporation of Delaware, a corporation of Delaware

No Drawing. Application April 5, 1943, Serial No. 481,894

2 Claims. (Cl. 148—21.5)

This invention is concerned with the problem of heat treating electrical silicon steel to develop its electrical and magnetic properties, the object being to repeatedly heat treat successive charges of this steel so as to obtain the same results charge after charge.

With the above in mind, the invention involves hermetically sealing a plurality of similar charges of electrical silicon steel in a plurality of similar enclosures and successively heat treating these charges while in these enclosures. More specifically, the plurality of similar charges of electrical silicon steel are individually enclosed in a plurality of similar metal boxes which are then hermetically welded shut, the charges then being successively heat treated while in these boxes. Each charge should be similar to the others in composition, weight and form, and each box should be provided with an atmosphere that is similar to that in the others as to composition, volume and pressure, whereby all the charges are heat treated under positively similar atmospheric conditions.

It is to be understood that the charges of electrical silicon steel will usually be in the form of stacked sheets or coils. The charges should all be of the same grade of electrical silicon steel, and should have the same weight and form, the weight depending on what can be conveniently handled. The boxes may be made of sheet metal, should all be capable of containing the same volume of atmosphere and should be of the same shape. They must be capable of being welded shut and care should be taken to assure that when shut by welding they are hermetically sealed. If desired, the boxes may contain an atmosphere of a specific composition or may contain material capable of modifying the atmosphere during the heat treatment cycle. Once the charges are hermetically sealed in the boxes in the uniform manner described, it is possible to know that the only way their electrical and magnetic properties can be modified by heat treatment is in a way that is entirely uniform in the case of all the charges, assuming, that the time and temperature values of the heat treatment are the same in all instances.

The charges are then successively heat treated in any heat treating furnace having an adequate temperature control. Such heat treatment may be carried out for any of the usual purposes such as to anneal, vary the composition of the steel, develop its grain size, etc. It is to be understood that in the commercial heat treatment of such steel the quantity of the steel to be heat treated is greater than can be accommodated by the furnace, it therefore being necessary to successively charge the furnace until all the steel is heat treated. In the case of the present invention, the successive charges are of the same weight and form and are enclosed in an atmosphere of the same volume, pressure and composition, whereby the heat treating variables are are reduced, simply, to time and temperature which may be controlled with relative ease in the case of commercial heat treating furnaces of reasonably modern design. Therefore, by keeping the time and temperature values of the heat treatment of each charge the same in all instances, it becomes possible to develop the same electrical and magnetic properties uniformly in the case of all the charges.

The steel may remain in the boxes until finished and ready for the user. Even then, the steel may remain in the boxes and be shipped, while so enclosed, to the user, the welded metal boxes forming shipping containers. The metal from which these boxes are made may be ordinary plain carbon sheet steel or steel containing alloys calculated to effect a modification of the atmosphere in the boxes during heat treatment. The important thing is that each charge is hermetically enclosed during its entire heat treatment so as to positively eliminate the variables involved by prior art heat treatment methods.

I claim:

1. A method including enclosing a plurality of similar charges of electrical silicon steel individually in a plurality of similar metal boxes, hermetically welding said boxes shut and successively heat treating said charges while in said boxes.

2. A method including enclosing a plurality of similar charges of electrical silicon steel individually in a plurality of similar metal boxes, hermetically welding said boxes shut and successively heat treating said charges while in said boxes, said charges being similar in composition, weight and form, and said boxes being each provided with an atmosphere that is similar to that in the others as to composition, volume and pressure, whereby all the charges are heat treated under positively similar atmospheric conditions.

JOHN JOHNSTON.