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TREATMENT OF SILICON STEEL

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This invention resides in certain departures from the usual, standard or normal treatment of silicon steel so as to improve certain properties thereof.

It has been found that if silicon steel having a silicon content of about 4% or over is made and finished in the usual way that the grade of the material as to its electrical or magnetic properties is non-uniform and not as high as is desired in steel intended for such purposes, and in addition, if the final reduction of the sheets is made at too high temperature the sheets cannot be separated without tearing them. These and other defects are recognized in the industry but have per se been accepted, in view of the lack of adequate remedy therefor.

One of the objects of my invention is so to treat silicon steel that upon rolling or reducing sheets are obtained of high grade and of uniform electrical and/or magnetic properties.

Another object is to reduce the number of steps required in finishing silicon or other steel and improving the quality of the product.

A further object is to simplify and shorten the final treatment of silicon steel with a consequent economic advantage.

A still further object is to simplify and shorten the finishing treatment of silicon steel by reducing the number of finishing passes and decreasing the finishing temperature.

Other and further objects and advantages will be understood by those skilled in this particular art or will be apparent hereinafter.

In its broad aspects my invention consists in reducing the number of passes in the finishing mill, thereby resulting in more reduction per pass and the final pass or reduction is made at a temperature lower than that heretofore practiced in or known to the industry. This results in a uniform product as to electrical or magnetic properties and the grade of the sheets obtained is distinctly better.

The usual practice in the rolling of silicon steel during recent years has been to give the steel seven passes in the finishing mill, the reduction per pass being suitably adjusted to the number of passes and the requirements to be met. I have found, however, that I am able to eliminate two passes and yet obtain an unexpectedly better product, whereby I give the steel five passes instead of seven, and hence a proportionately greater reduction per pass, but in addition to this the final reduction is made at a lower temperature than that heretofore used or thought possible.

In the final pass or in the pass in which the final reduction is made the silicon steel sheets are entered at about 1300° F., which so far as I am aware, is a new and an unusually low temperature for the treatment involved. Such sheets may have, for example, a silicon content of about 4% or somewhat over that and yet by the above departures from the usual process I obtain a distinctly better grade of sheet so far as electrical and magnetic properties are concerned and I believe that the lower temperature involved assists appreciably in the final excellent result. If the temperature is materially above this point, the additional disadvantages are met that the sheets cannot subsequently be separated one from the other without tearing them, it being understood that such sheets are generally rolled in suitable packs, although they can be rolled singly or in any desirable number.

Not only have I discovered that the use of this reduced number of passes and the lower temperature improves unexpectedly the quality of the product, but I have additionally found that the exact degree of temperature must be adjusted to the percentage of silicon in the steel. The higher the silicon content of the steel, the lower must be the temperature of the pack in the final rolling.

It must be realized, however, that I contemplate various modifications, substitutions, omissions or additions in or to the above process or steps thereof without departing from the spirit and scope of the invention which, moreover, is adaptable to all types of steels or alloys wherein the above principles

and advantages may be found advantageous or desirable.

What I claim as new and desire to secure by Letters Patent is:

1. The steps in the manufacture of silicon steel sheets of about a 4% silicon content consisting in passing starting pieces through five finishing passes, increasing the average reduction per pass so that the same reduction is obtained as if seven passes had been made, and decreasing the temperature of the final reduction to about 1300° F.

2. The steps in the manufacture of silicon steel sheets of about a 4% silicon content consisting in passing starting pieces through five finishing passes, increasing the total reduction in the five passes to equal the reduction normally secured by seven such passes, and decreasing the temperature of the final reduction below the normal used an amount depending on the precise silicon content and varying inversely thereto.

In testimony whereof, I have hereunto subscribed my name this 2nd day of December, 1930.

WILLIAM F. DETWILER.