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METHOD OF MANUFACTURING SELENIUM RECTIFIERS

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4 Claims. (Cl. 175-366)

This invention relates to a method of manufacturing selenium rectifiers.

In order to apply when manufacturing a rectifier the selenium coating on a support of light metal it is necessary to roughen the surface of the support or to prepare the same in such a manner that the joint between the support metal and the selenium is as satisfactory as possible both from a mechanical and electrical point of view. To this end, the jet sand blast may be employed to advantage.

According to the invention the support of aluminum, magnesium, alloys thereof or of an equivalent light metal is pickled before applying thereto the selenium in order to roughen the surface. The advantage obtained thereby is probably based upon the fact that the jet sand blast causes sharp tiny points to be produced on the surface. The selenium adheres insufficiently or not at all to these sharp points. Consequently, the counter-electrode which is normally sprayed onto the selenium coating easily comes into direct contact with these points of the light metal support, thus causing short-circuits. If it should not be possible to eliminate these short-circuits during the forming process or similar processes of treatment, the element is of no value. The pickling has furthermore the advantage that it is not so critical as the treatment by means of a sand jet; however, the joint is above all more intimate and more durable than when roughening the surface by means of a sand jet and consequently the seasoning effect of the rectifiers is decreased.

When pickling an aluminum surface, hydrochloric acid with a slight addition of iron is employed according to the invention to a particular advantage. One gram of iron in one liter of hot hydrochloric acid diluted in the ratio 1:1 gives particularly satisfactory results. By pickling with such an agent, the surface to which the selenium may adhere is increased on the one hand and on the other hand it is freed in an effective manner of the foreign layers which do not consist of pure aluminum. The adhesion is obviously based on the formation of selenide of aluminum in the form of an intermediate layer. A foreign layer, particularly an oxide layer prevents under circumstances the formation of such an intermediate layer, so that the necessary adhesion is not brought about.

A rectifier according to the invention is manufactured, for instance, in the following manner. A support which may consist of com-

mercial aluminum is pickled in diluted hot, hydrochloric acid to which is added one gram of iron per liter. To the surface which when pickled must be protected against further chemical attacks, molten selenium is applied and subjected in a press to a sufficient pressure which ensures a proper and uniform distribution of the selenium on the surface of the aluminum plate. The plate is then heat treated in a furnace at a temperature somewhat about 200 degree centigrade for one or more hours, care being taken to ensure a sufficient amount of air to be admitted. During this period the selenium is converted into an electrically conductive state. The selenium coating is then subjected for a short time to the action of sulphur vapors. In this manner a discontinuous film of sulphur is produced on the selenium coating, on which film is sprayed a layer of a metal of low fusibility, for instance, an alloy of lead and bismuth or of cadmium and bismuth.

The rectifier element thus produced is then formed by the action of an electric current by applying in the inverse direction a direct voltage which increases with increasing resistance in the inverse direction, for instance, from 5 to about 18 volts, the current flowing at the beginning in the inverse direction thus decreasing under the action of the voltage to a few milliamperes.

What is claimed is:

1. The method of manufacturing a selenium rectifier which consists of melting a selenium coating on a support of light metal, for instance, aluminum, magnesium or the alloys thereof, which has been pickled in hydrochloric acid with a slight addition of iron before applying the selenium thereto, heat treating said rectifier at above substantially 200 degrees Centigrade, and spraying a film of metal of low fusibility on said selenium.

2. The method as set forth in claim 1, characterized in that the surface is pickled in hydrochloric acid with an addition of iron amounting to substantially 1 gram of iron per liter of hydrochloric acid.

3. The method as set forth in claim 1, characterized in that the pickling is effected in diluted hot hydrochloric acid.

4. The method as set forth in claim 1, characterized in that the pickling is continued until the surface of the discs assumes a marbled grey appearance.

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