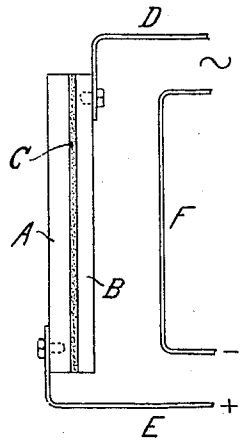
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RECTIFIER DEVICE

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RECTIFIER DEVICE

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4 Claims. (Cl. 175—366)

This application is a continuation in part of my copending U. S. application Ser. No. 65,577, filed February 25, 1936.

The use of selenium rectifiers for the purpose of rectifying alternating current is well known in the art. This type of rectifiers or rectifier valves generally consists of a base plate of a ferrous metal and a layer of selenium intimately united with the surface of said iron plate. During the manufacturing process of such rectifiers, the layer of selenium when applied to the base plate is converted into its grey-crystalline state by means of a heat treatment, whereupon the crystalline surface is coated, preferably by sputtering, with any suitable metal or metal alloy which acts as the counter-electrode of the rectifier valve.

It is well known that the load capacity of a selenium rectifier depends upon the ratio of the traversing current to the return current. In fact, the lower the resistance becomes in the traversing direction and the higher the resistance offered in the return or choking direction, the superior is the capacity of the rectifier. In order to improve this ratio it has been proposed to add small quantities of earth metals, preferably cerium, to the selenium layer above referred to. It was possible on account of this expedient to considerably increase the efficiency of selenium rectifier valves.

Careful investigations carried out in this field by applicant have proven that it is possible to still involve a considerable improvement with respect to the properties of selenium rectifiers when small quantities of any halogen compound are added to the selenium layer. The results thus obtained according to the above given rule are superior over those obtained in accordance with the heretofore known method of adding earth metal or earth metal compounds to the selenium layer.

My invention will be more readily understood from the following description taken in conjunction with the accompanying drawing, the single figure of which shows a side view of a selenium rectifier of any conventional type to which the teachings according to my present invention may be applied.

This rectifier consists of two plates or electrodes A and B with an intermediate layer C of selenium. The lead D connects the electrode plate B of the rectifier with one terminal of an alternating current generator (not shown), the other terminal of which is directly connected through conductor F with the minus pole of a continuous current load likewise not shown since this load is immaterial in connection with this invention. The plus pole of this load is connected with the electrode plate A of the rectifier A, B, C by means of the lead E.

According to the main feature of this invention the property of the selenium layer of rectifiers of the above mentioned type is essentially improved when small quantities, that is a low percentage by weight of any halogen compound of earth metals, alkaline earth metals and rare earths, are added to the selenium layer of the rectifier. It has been found that the resistance offered in the traversing current direction of the selenium layer relative to a constant resistance in the blocking or choking direction is considerably reduced when any or several of the above identified compounds are added to the selenium layer. Rectifier valves manufactured in accordance with the rule stated above may consequently be operated with considerably higher powers than the heretofore known types of rectifiers without subjecting the electrode plates to a temperature augment, since the Joulean losses are substantially reduced in rectifier devices produced in accordance with this invention.

Superior improvements in the above mentioned sense are obtained with halogens when either of the iodide compounds cerium iodide, thorium iodide or zirconium iodide is added in small quantities to the selenium layer of the rectifier.

Also bromide, chloride and fluoride compounds of cerium, thorium and zirconium such as cerium bromide, thorium bromide, zirconium bromide, cerium chloride, thorium chloride, zirconium chloride, cerium fluoride, thorium fluoride, zirconium fluoride and the like added in small quantities to the layer of selenium beneficially improve the efficiency of the rectifier. Among the above mentioned compounds, the cerium bromide has been found to involve the most satisfactory results.

Even halogenous compounds of alkaline earth metals and rare earths when added in small amounts to the selenium layer of a rectifier valve satisfactorily improve the properties thereof.

The halogen compounds involve the essential advantage that they are readily soluble in selenium so that it is possible to ensure a perfect and uniform distribution of these compounds in and on the layer of selenium.

The above mentioned halogen compounds may be added as a solvent to the selenium before its application to the base plate in which case an

extremely fine distribution of the compound in the selenium layer is obtained. However, it is likewise possible to add the compound in the form of a powder to the likewise pulverized selenium during the course of preparation and to remelt the resulting mixture, or the compound may be added in any suitable state to the selenium in its molten condition.

The beneficial effect according to the invention is also obtained in cases that, in addition to small quantities of halogen compounds, other known compounds are added to the selenium layer. It is also possible to improve the properties of selenium rectifiers by adding to the selenium layer any compound, either metallic constituent of which forms a new compound with the selenium without departing from the scope of this invention.

What is claimed is:

1. A rectifier device comprising two electrode plates and an intermediate layer therebetween essentially consisting of selenium to which is added the metal halide cerium iodide.

2. A rectifier device comprising two electrode plates and an intermediate layer therebetween essentially consisting of selenium to which is added the metal halide cerium bromide.

3. A rectifier device comprising two electrode plates and an intermediate layer therebetween essentially consisting of selenium to which is added a metal halide consisting of a halogen and cerium.

4. A rectifier device comprising two electrode plates and an intermediate layer therebetween essentially consisting of selenium to which is added the metal halide cerium chloride.

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