July 19, 1938. J. OSAWA 2,124,306

ELECTRICAL DEVICE

Filed July 17, 1935

FIG. 1.

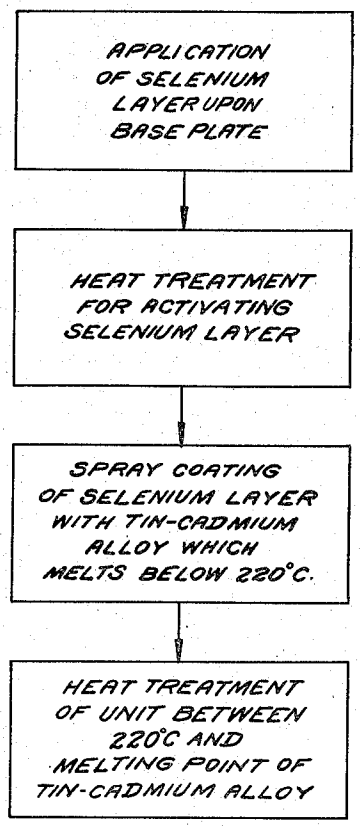
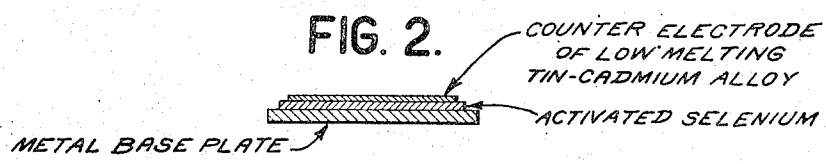


FIG. 2.



INVENTOR
JUICHI OSAWA
BY E. D. Rumney
ATTORNEY

Patented July 19, 1938 2,124,306

UNITED STATES PATENT OFFICE

2,124,306

ELECTRICAL DEVICE

Juichi Osawa, Shibaku, Tokyo, Japan, assignor to International Standard Electric Corporation, New York, N. Y., a corporation of Delaware

Application July 17, 1935, Serial No. 31,892
In Japan August 8, 1934

5 Claims. (Cl. 175—366)

This invention relates to electrical devices and in one aspect thereof to an improvement in a method of manufacturing a selenium rectifying plate characterized in this that a metal having a melting point lower than the selenium is attached as an upper electrode to the surface of the selenium which had been activated, and that a special heat treatment is applied thereto from several minutes to several hours at a medium temperature which is higher than the melting point of the upper electrode metal and lower than the melting point of the selenium. The lower electrode may be of any suitable metal for use in selenium cells as disclosed in the prior art, for example, a metal or metal alloy of the iron group.

One object is to provide a method of manufacturing a selenium rectifying plate which brings about a good rectifying layer between a selenium and an upper electrode.

It is a well-known fact that the object which is provided with an upper electrode upon the surface of a lower electrode formed by applying selenium upon a metal plate and then by giving a suitable heat treatment to said metal plate to form so-called an active selenium presents a rectifying action. It is said that said rectifying action is caused by the influence of a layer which is produced between the upper electrode and the surface of the selenium of a selenium electrode and heretofore various methods had been carried out as said upper electrode metal and method of attachment. For instance, one of said methods is to press against the selenium a soft metal, as a lead, or to blow a pewter thereupon. In this invention, a metal having a melting point lower than that of the selenium, that is 220° C., such as a tin-cadmium alloy and the like is employed as an upper electrode and it is proposed to attach said alloy to the surface of the active selenium which had been applied upon the lower electrode as mentioned above by means of a blowing method and the like and then to give a special heat treatment thereto. As said heat treatment, it is to maintain said composition material from several minutes to several hours at a medium temperature which is higher than the melting temperature of said upper electrode metal and lower than the melting point of selenium or 220° C. In the attached drawing Fig. 1 schematically represents the sequence of steps of a preferred process, and Fig. 2 illustrates in section the article produced thereby.

As the result of such heat treatment, it causes the decrease of a leakage current upon the manufactured goods followed by the increase of a rectifying current and thus it is known that the rectifying characteristic is improved considerably. This reason cannot be fully explained yet, but mainly as the result of said heat treatment the upper electrode metal being once melted into a fluid condition and again solidified, and hence it is considered that said effect is the result produced by making condition favorable for carrying the rectifying action into effect, the attachment against the selenium being made closer at that time, and the surface of the selenium being subjected to more or less change by said heat treatment at the same time.

It has been found by experiment, that as the result of the heat treatment of this invention the ratio of rectification had been increased from several times to several ten times compared to a well-known method.

What is claimed is:

1. A method of manufacturing a selenium rectifier having upper and lower metallic members which comprises applying selenium to the lower member, activating the applied selenium by suitable heat treatment, attaching to the surface of the activated selenium said upper metallic member which has a melting point lower than that of the selenium, and subjecting said attached members to a heat treatment at a temperature intermediate the said melting points for a period of from several minutes to several hours.

2. A method of manufacturing a selenium rectifier according to claim 1, which employs a tin-cadmium alloy as an upper electrode.

3. The method of improving the operating characteristics of a selenium rectifying plate having upper and lower metal electrodes separated by selenium attached to the upper electrode which latter has a melting point lower than the selenium, which method comprises subjecting said attached members to heat treatment at a temperature intermediate the melting points for a period of from several minutes to several hours.

4. The method of improving the operating characteristics of a selenium rectifying plate having an upper metal electrode separate from a lower electrode by selenium attached to the upper electrode which latter has a melting point lower than the selenium, which method comprises subjecting the upper electrode with the attached selenium to a heat treatment at a temperature intermediate the melting points of said upper electrode and said selenium for a period of from several minutes to several hours.

5. The method of manufacturing a selenium

rectifying plate having upper and lower metal electrodes separated by activated selenium carried by the lower and attached to the upper electrode, the melting point of the selenium being higher than that of the upper electrode, which method includes the steps of subjecting said upper electrode with the attached selenium to a heat treatment at a medium temperature higher than the melting point of the upper electrode but lower than the melting point of the selenium for a period of from several minutes to several hours and thereafter cooling to solidify said upper electrode.

JUICHI OSAWA.