

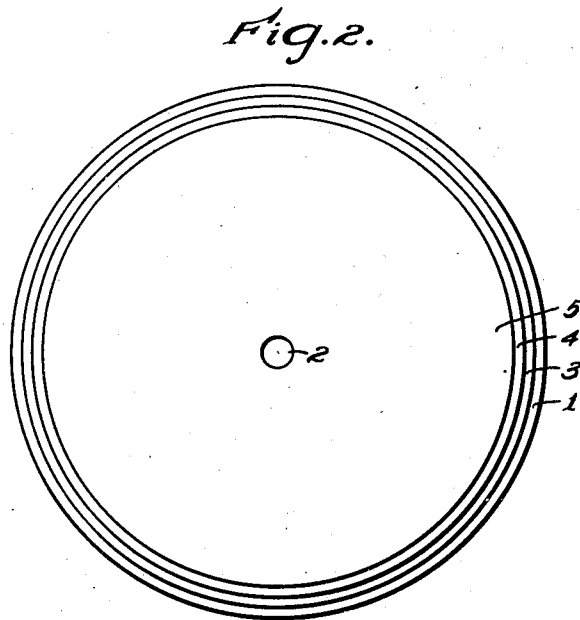
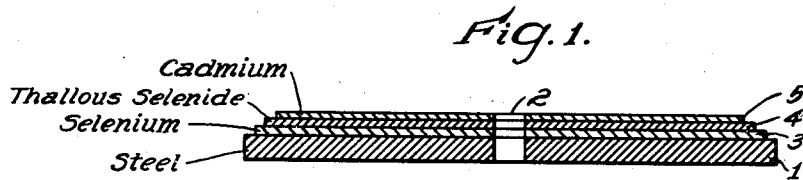
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2,479,301

SELENIUM RECTIFIER

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WITNESSES:

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2,479,301

SELENIUM RECTIFIER

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6 Claims. (Cl. 175—366)

1

Our invention relates to dry-contact rectifiers or light-sensitive devices and particularly to devices of this type which employ a layer of selenium.

One object of our invention is to provide a selenium rectifier or light-sensitive device in which the surface of the selenium at which the rectification or photo-electric effect is produced is provided with a boundary layer which insures a high resistance to current flow in the nominally non-conductive direction when an alternating voltage is impressed upon it. Such a layer may be referred to as a blocking layer.

Another object of our invention is to produce on a selenium layer a blocking layer which has a high resistance to current flow in the nominally non-conductive direction but which does not introduce a high resistance to current flow in the nominally conductive direction.

Another object of our invention is to provide a selenium layer with a blocking layer which shall not undergo such chemical reaction during the practical use of the device incorporating it that the latter will change its electrical characteristics, or as it is sometimes termed will "age," at a deleterious rate in service.

Other objects of our invention will become apparent upon reading the following description, taken in connection with the drawing in which Figure 1 is a sectional elevation and Fig. 2 a top plan view of a rectifier embodying the principles of our invention.

Referring in detail to the drawing, the rectifier comprises a base-plate 1 which may comprise steel which has first been sand-blasted on the surface and thereafter nickel-plated. The plate 1 thus prepared is preferably provided with a central hole 2 by which it may be mounted upon a spindle provided with means for rapidly rotating it. The plate and spindle while in rotation are dipped into molten selenium and then withdrawn therefrom. The centrifugal force removes all of the selenium except a thin uniform layer 3 from the surface of the plate. The coated base plate is then submerged in a .01 normal water solution of thallous hydroxide at about 25° C. The plates are removed in about 20 seconds and rinsed in distilled water at room temperature. No alkaline precipitate is left on the free selenium surface. It appears that the barrier layer 4 is formed by the chemical reaction of the thallous ion with the exposed selenium thus forming a continuous film of thallous selenide as the new free surface. While the unit thus produced may next be annealed at the temperature of 185° C. and provided with a contact layer 5 of some low melting good conductor such as

2

cadmium or one of the alloys of cadmium and tin, we prefer, in accordance with the process described in copending application Serial No. 509,817, filed November 10, 1943, in the name of Wayne E. Blackburn, now Patent No. 2,447,630, granted August 24, 1948; to apply the said contact layer first to the thallous selenide surface and thereafter to anneal the unit by heating it to the temperature of the order of 185° C. for a suitable period, for example, for a time between six and sixteen hours. The unit rectifier, when made in accordance with the process just described, may then be connected to electrical circuits in any of the standard connections for rectifier discs.

We claim as our invention:

1. The method of producing an electrical surface element which comprises producing a surface of selenium and immersing it in a water solution of 0.01 normal concentration of thallous hydroxide.
2. The method of producing an electrical surface element which comprises producing a surface of selenium and immersing it in a water solution of 0.01 normal concentration of thallous hydroxide at about 25° C.
3. The method of producing an electrical surface element which comprises producing a surface of selenium and immersing it in a water solution of 0.01 normal concentration of thallous hydroxide for about 20 seconds.
4. The method of producing an electrical surface element which comprises producing a surface of selenium and immersing it in a water solution of 0.01 normal concentration of thallous hydroxide at about 25° C. for about 20 seconds.
5. An electrical circuit element comprising a base-plate having a portion of its surface coated with selenium, the surface of said selenium being coated with thallous selenide and the surface of said thallous selenide being provided with a cadmium counter-electrode.
6. A rectifier comprising a base-plate having a layer of selenium thereon which is provided with a coating of thallous selenide, the surface of said thallous selenide being provided with a cadmium contact layer.

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REFERENCES CITED

The following references are of record in the file of this patent:

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Number	Name	Date
2,361,157	Thompson et al.	Oct. 24, 1944