

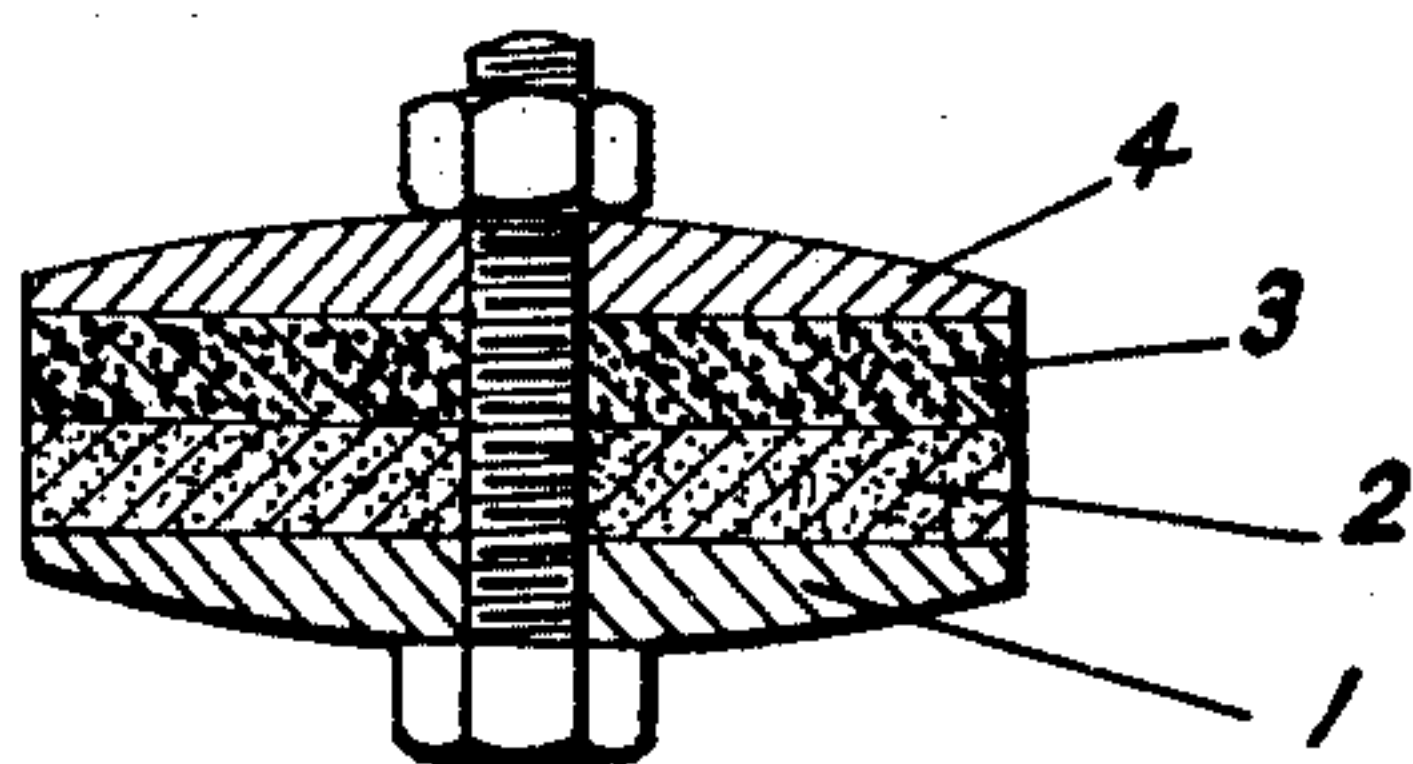
June 5, 1934.

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1,961,729

CURRENT RECTIFIER

Filed Oct. 24, 1931



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## UNITED STATES PATENT OFFICE

1,961,729

## CURRENT RECTIFIER

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Application October 24, 1931, Serial No. 570,891  
In France December 30, 1930

11 Claims. (Cl. 175—366)

It is well-known that alternating current may be rectified into direct current by the use of couples placed in contact with each other, having components of widely differing natures and degrees of conductivity, unilateral conductivity being greater or less, according to the electrical properties of the elements used.

Rectifying couples in general use consist of easily oxidizable metals such as aluminium and magnesium, associated with various substances, oxides, sulphates and the like. Such couples have the disadvantage of polarizing after a certain period, whereby their lasting qualities are restricted and the applications of the system are limited.

The inventor has discovered that when certain iodides and bromides are placed in contact with a metalloid such as silicon, they constitute a couple which is free from the foregoing disadvantages.

The invention is therefore based in principle upon a rectifying couple consisting of a layer of iodide or bromide, especially those of copper, and of a metalloid, silicon for example, in the form of a plate or preferably that of a powder, said layers being brought into contact under adequate pressure. A couple thus formed produces very remarkable rectifying phenomena.

It may be mentioned in this connection that a pastille or plug having a superficial area of two square centimetres and consisting of silicon and of iodide or of bromide of copper is adapted to furnish rectified current subject to an effective tension of 10 to 12 volts, in the case of an alternation approximating to 0.5–0.7 ampere, and an output close to the theoretic output. Within a wide range of temperatures (between  $-100$  and  $+200^{\circ}$  C.) the effects obtained are but slightly affected by the action of heat.

The critical tension, at which the contact ceases to rectify owing to inner disruption, depends upon the degree of compressibility of the powders and their granular structure and the thickness of the layers, but it is always extremely high and may reach 30 to 35 effective volts at a normal temperature ( $20^{\circ}$  C.). Under such conditions and subject to adequate cooling a rectified current of a mean intensity of about one ampere may be passed through a single pastille but practically it is preferable that the couple should not work in a range close to the disruption tension.

Applicant has ascertained that the rectifying action may be stabilized by adding to the powdered iodide or bromide of copper a small percentage of a substance such as binoxide of manganese, oxide of zinc or of nickel and of other substances adapted to polarize the adjoining layer of silicon by solid electrolysis.

The iodide and the bromide may be used as a

plate agglomerated under pressure with a binding material, or as a powder or again as a powder combined with a binding agent such as a varnish having a synthetic rosin basis, shellac, copal and the like. It is furthermore preferable to apply said powders or agglomerates upon a support such as paper or a fabric.

The silicon powder may be supported in like manner.

The attached diagram illustrates by way of example and without limiting the scope of the invention a preferred embodiment of the pastille adapted to act as rectifying couple.

In said drawing, 1 denotes a disc of any metal such as copper, for example, carrying a layer of the rectifying substance 2. 3 is the layer of silicon and 4 is a second electrode.

The arrangements hereinbefore disclosed are intended to serve as examples only and all constructional details, shapes, dimensions and materials used may be varied without departure from the principle of the invention.

What I claim is:

1. A current rectifier constituted by means of a couple formed by a cuprous haloid in contact with silicon.

2. A current rectifier constituted by means of a couple formed by a cuprous iodide in contact with silicon.

3. A current rectifier constituted by means of a couple formed by a cuprous bromide in contact with silicon.

4. A current rectifier constituted by means of a couple formed by copper iodide in powdered form and silicon in powdered form.

5. A current rectifier constituted by means of a couple formed by copper bromide in powdered form and silicon in powdered form.

6. A current rectifier consisting of a support, powdered copper iodide on said support, a second support, powdered silicon on said second support, said supports being placed together with the powder-supporting sides thereof toward each other.

7. A current rectifier constituted by means of a couple formed by agglomerated copper iodide and agglomerated silicon.

8. A current rectifier constituted by means of a couple formed by a copper haloid, a polarizing substance, and silicon.

9. A current rectifier constituted by means of a couple formed by a copper haloid, manganese dioxide, and silicon.

10. A current rectifier constituted by a couple formed by copper iodide in contact with silicon.

11. A current rectifier constituted by a couple formed by copper iodide with a polarizing substance, and silicon.

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