

AMENDED SPECIFICATION.

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1907 to 1928.

PATENT SPECIFICATION

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Complete Accepted: Dec. 17, 1930.

COMPLETE SPECIFICATION (AMENDED).



Improvements in or relating to Photo-electric Cells.

We, ARCTURUS RADIO TUBE COMPANY, a corporation of the State of Delaware, United States of America, of 260, Sherman Avenue, Newark, New Jersey, United States of America, Assignees of SAMUEL RUBEN, a citizen of the United States of America, of 801, Riverside Drive, City and State of New York, United States of America, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to a photo-electric cell and more particularly, it relates to a cell of this type which generates a potential through the reaction between one of its electrodes and an electrolyte. An object of the invention is the provision of a photo-electric cell which is rigid and of high sensitivity to light rays.

In the literature bearing upon this art are described certain experimental photo-voltaic cells which employed the potential generated through the conversion of cuprous oxide to cupric oxide under the influence of light. However, as only a thin superficial layer of the oxide was available for such use, the apparatus were of very short life; and further, an inherent material lag in response to exposure to light rays existed.

In devices constructed under the terms of my invention the response to exposure to light rays is instantaneous and the life of the apparatus is prolonged. Cuprous oxide is employed as the light-sensitive electrode to control the internal resistance of the cell. There is no photo-chemical change in this material with such exposure. This electrode with its cooperating cathode which is composed of a material relatively electro-positive is placed in a translucent container immersed in an electrolyte which also is translucent between which liquid and the cathode

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material there is an electrolytic action by which a cell potential is generated, as controlled by the decrease of electrical resistance of the cuprous oxide anode under the influence of visible radiation.

A photo-electrolytic cell according to the invention comprises a copper anode having a layer composed of a copper compound, such as cuprous oxide and a cathode associated therewith containing zinc. The cathode preferred, however, is zinc, amalgamated with mercury, this alloy being employed to maintain local effects at a minimum when the cell is not in use.

Any suitable electrolyte which is adequately translucent may be employed, it being important that the translucency be maintained. I prefer ammonium or zinc chloride as the electrolyte and I find that by the addition of a protective emulsoid, such as glycerine, gum-arabic or tragacanth, the desired colloidal state is maintained without the production of the large particles of the cathode material in the solution.

An important characteristic of this type of cell is that a constant internal resistance value is maintained, so that the cell instantaneously returns to its initial state, as the influence of light rays is removed.

As the cell operation is dependent upon the electronic change of resistance of the exposed light-sensitive electrode surface, and not upon any photo-chemical potentials, response to light rays is instantaneous. In a cell of the kind described, with the exposure of an anode having an area of 10 square centimeters, to a light source of sufficient intensity a cell potential of 0.6 volts is generated with a current of 8 milliamperes.

Reference is made to the accompanying drawing of one embodiment of the invention in which 1 is a glass container having, to provide for the escape of excess gas, a rubber cap 2, with an orifice 2a.

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The container is filled with a solution 3, of 10% ammonium chloride, with 5% of glycerine. The ammonium chloride solution is preferred because of its trans-
 5 lucency, chemical stability and contact potential with the cathode. Immersed in electrolyte 3, is copper electrode 4, its concave surface having thereon an integrally
 10 formed layer of fused cuprous oxide 4a, the convex surface being coated with asphaltum 4b. Electrode 4 is supported by metal rods 4c. At 5 is a zinc mercury
 cathode mounted on supports 5a.

15 Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

20 1. A photo-electrolytic cell comprising a copper anode having a layer composed of a copper compound, such as cuprous oxide and a cathode associated therewith containing zinc.

25 2. A photo-electrolytic cell comprising a copper anode having a layer composed of a copper compound, such as cuprous oxide, and a cathode composed of zinc and mercury.

3. A photo-electrolytic cell according to claims 1 and 2, in which the electrodes are
 30 immersed in an electrolyte solution of a haloid compound, such as ammonium chloride or zinc chloride.

4. A photo-electrolytic cell as claimed in claim 2, in which the electrolyte in-
 35 cludes an emulsoid.

5. A photo-electrolytic cell as claimed in claim 4, in which the electrolyte comprises an emulsoid including glycerine.

6. The improved photo-electrolytic cell
 40 substantially as hereinbefore described and illustrated.

Dated the 17th day of September, 1929.
 For ARCTURUS RADIO TUBE

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 Rollinson,

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Reference has been directed, in pursu-
 45 ance of Section 8, Sub-section 2, of the Patents and Designs Acts, 1907 to 1928, to specification No. 317,837.

[This Drawing is a full-size reproduction of the Original.]

