UNITED STATES PATENT OFFICE.

MARCUS RUTHENBURG, OF PHILADELPHIA, PENNSYLVANIA.

ELECTRODE.

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To all whom it may concern:

Be it known that I, MARCUS RUTHENBURG, of Philadelphia, in the State of Pennsylvania, have invented certain new and useful Improvements in Electrodes, whereof the following is a specification.

My invention relates particularly to electrolytic apparatus adapted for employment in the electrolysis of chlorid of sodium and other chemicals of the chlorin group.

In all such electrolytic apparatus of the prior art, wherein metals are employed as electrodes, the latter are at once attacked by the free chlorin, etc., liberated by the electrolytic action, and the apparatus can only be maintained operative for brief periods limited by the destruction of the electrodes, and, at the termination of each period of operation, the apparatus must remain inoperative a sufficient length of time to permit renewal of the electrodes.

Aside from the well known fact that apparatus employing heat cannot be economically operated in the intermittent manner aforesaid; the average output of a given apparatus is materially curtailed by the aforesaid enforced periods of idleness, and, of course, the cost both for material and labor in renewing the electrodes forms a large item of expenditure for maintenance of such apparatus.

It is the object of my invention to reduce the cost of electrolysis of chlorid of sodium and the like, by providing an electrode which is not only an efficient conductor of electricity but also capable of resisting the attack of free chlorin, chlorous acid, other chlorous compounds, and nitric acid.

My invention consists of an electrode formed of a compound comprising silicon and another substance which is a conductor of electricity; such as metallic copper, carbon and the like, capable, *per se*, of resisting the action of chlorous acid; which compound is characterized by its capacity to both conduct electricity and resist the action of free chlorin.

It will be understood that the employment of my invention results in great commercial advantage in the art of electrolysis, for it enables apparatus of the class specified to be operated continuously at full capacity; thus not only securing the most economical expenditure of heat units in such apparatus but also insuring the largest output of which the apparatus is capable, and, of course, with the minimum cost of maintenance of the apparatus, there being no expenditure for renewal of the electrodes.

In employing my invention in the decomposition of chlorid of sodium, I have found it convenient to use electrodes formed of a compound comprising a metal alloyed with from ten to twenty-five per cent. of silicon. However, I have found that the characteristics which are essential to my invention are exhibited by compounds comprising silicon and and other substances which are conductors of electricity such as carbon, and the like. Therefore, I do not desire to limit myself to compounds which contain copper or carbon or in which the silicon exists in the proportions named, as it is obvious that various modifications may be made without departing from the essential features of my invention. However, I am aware that electrodes have heretofore been constructed wholly or in part of ferro-silicium and therefore limit my claims to an electrode which is of a non-ferruginous composition having the characteristics specified.

I claim:—

1. An electrode of the class specified, consisting of a solid mass of uniform non-ferruginous composition, comprising silicon and another ingredient, capable of resisting the action of free chlorin, chlorous acid and nitric acid; said electrode being characterized by its capacity to conduct electricity through its mass, substantially as set forth.

2. An electrode of the class specified, consisting of a solid mass of uniform non-ferruginous composition, comprising silicon and carbon, capable of resisting the action of free chlorin, chlorous acid and nitric acid; said electrode being characterized by its capacity to conduct electricity through its mass, substantially as set forth.

In testimony whereof, I have hereunto signed my name, at Philadelphia, in the State of Pennsylvania, this 14th day of September, 1901.

MARCUS RUTHENBURG.

Witnesses:

ARTHUR E. PAIGE,

E. L. FULLERTON.