

No. 709,971.

Patented Sept. 30, 1902.

E. EDSER & M. WILDERMANN.
ELECTROLYTIC DECOMPOSITION OF ALKALINE SALTS.

(Application filed Mar. 28, 1901.)

(No Model.)

2 Sheets—Sheet 1.

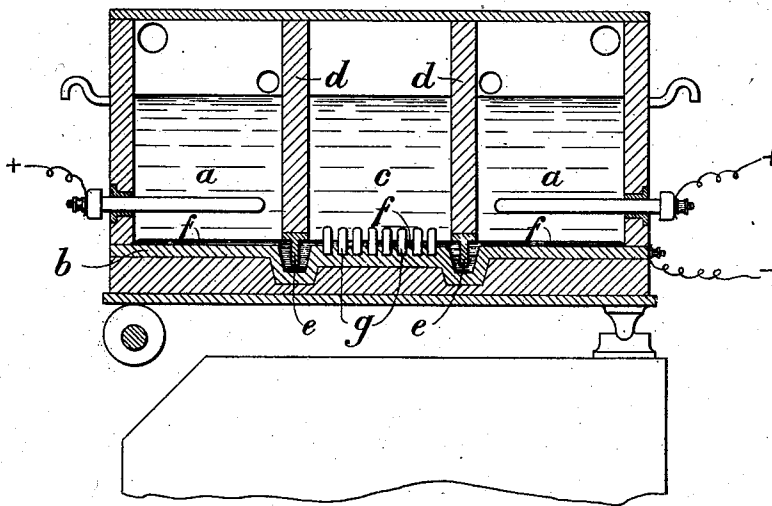


Fig. 2^b



Fig. 1.

Fig. 2.

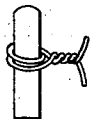


Fig. 2^a

Attest
Walter Donaldson
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Edwin Edser
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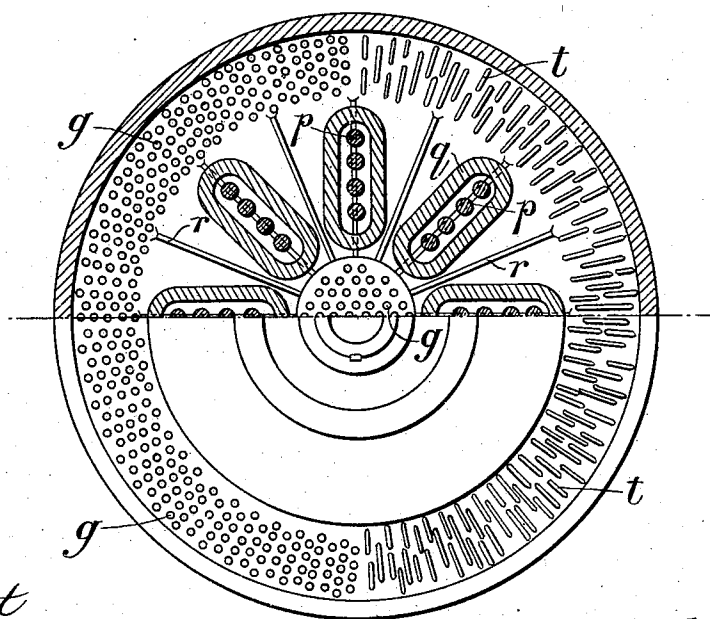
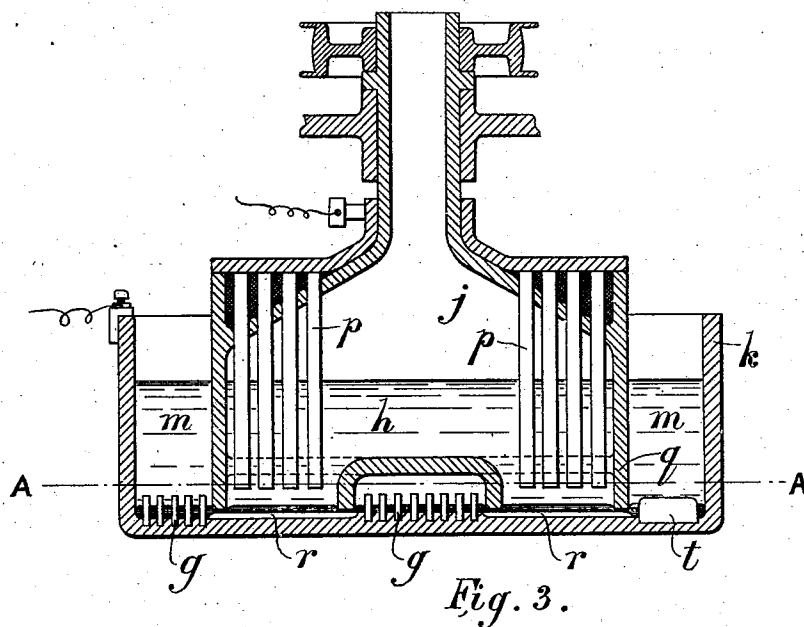
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2 Sheets—Sheet 2.



Attest
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Fig. 4.

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UNITED STATES PATENT OFFICE.

EDWIN EDSER AND MEYER WILDERMANN, OF LONDON, ENGLAND.

ELECTROLYTIC DECOMPOSITION OF ALKALINE SALTS.

SPECIFICATION forming part of Letters Patent No. 709,971, dated September 30, 1902.

Application filed March 28, 1901. Serial No. 53,276. (No specimens.)

To all whom it may concern:

Be it known that we, EDWIN EDSER, a subject of the King of Great Britain and Ireland, and a resident of 22 Fanthorpe Terrace, Lower Richmond road, Putney, London, S. W., and MEYER WILDERMANN, a subject of the Czar of Russia, and a resident of 10 Elers road, Ealing, London, W., England, have invented certain new and useful Improvements Relating to the Electrolytic Decomposition of Alkaline Salts, (for which we have made application for Letters Patent in Great Britain, No. 22,902, and bearing date December 14, 1900,) of which the following is a specification.

This invention relates to the electrolysis of alkaline metals in cells employing a mercury cathode, but of other types than that described and claimed in Patent No. 659,655, and has for its object to increase the speed with which alkaline metal existing as amalgam combines with water in the combining-compartment to form alkaline hydrate. It has heretofore been proposed to effect this object in such cells by placing small pieces of metal or their compounds on the surface of the amalgam in the combining-compartment of the cell, thereby producing local action. All these substances, however, are liable to reduction by the nascent hydrogen evolved during the process, and they eventually become coated with mercury or entirely amalgamated, so that their use is not successful. Small pieces of carbon on the surface of an amalgam in contact with water do not promote local action. We have found that this is due to the fact that the carbon and amalgam are not actually in contact unless part of the carbon be deeply immersed in the amalgam. This immersion is generally undesirable and is especially inconvenient in the forms of cells herein to be referred to. If, however, small pieces of carbon have part of their surfaces coated with suitable electrolytically-deposited metal, contact is insured and local action promoted. Similar results are also produced by employing small pieces of carbon having one or more metal wires tightly wound around them and by employing artificial carbons composed of finely-divided carbon and metal filings.

Our invention consists in the employment of small pieces of partially-metal-coated car-

bon, carbon provided with metal wires in close contact therewith, or a combination of finely-divided carbon and metal filings for producing local action between the amalgam and the water, whereby the rate of combination of alkaline metal in said amalgam with water to form alkaline hydrate is accelerated.

In order that the manner in which we carry our invention into effect may be clearly understood, we will now refer to the accompanying two sheets of drawings, which illustrate well-known forms of electrolytic cell with our invention applied to them.

Figure 1 shows a sectional elevation of a "Castner" type of cell. Fig. 2 is an enlarged view of an electrolytically-metal-coated carbon rod. Fig. 2^a is an enlarged view of a carbon with a wire wound around it. Fig. 2^b is an enlarged view of a rod composed of fine metal filings and carbon. Fig. 3 is a sectional elevation of a "Rhodin" type of cell, and Fig. 4 a part sectional plan of the same on the line A A of Fig. 3.

In the cell shown in Fig. 1 with our invention applied the decomposing-compartments *a a* are separated from the combining-compartment *c* by walls *d d* and mercury seals *e e*, the bottom of each compartment being covered by a layer of mercury *f*. By slightly rocking the cell the amalgam formed in the compartments *a a* by the passage of the electric current from the carbon anodes to the iron bottom *b*, which forms the negative electrode, is caused to circulate and enter the combining-compartment *c*, where it is decomposed, and the alkaline metal combines with water, forming alkaline-hydrate solution. To increase the speed at which this combination is effected, we apply our invention in this manner: On the bottom of the combining-compartment we fix rods *g*, of carbon, whose surfaces are partially coated with electrolytically-deposited metal, preferably iron, (see Fig. 2^a), or carbon rods with one or more turns of thin iron wire tightly wound around their lower ends, as shown at Fig. 2, or they may be composed of finely-divided carbon and iron filings, as seen in Fig. 2^b. The rods *g* are of such a length that they project through the layer of mercury into the solution above. Where the amalgam comes in

contact with these carbons, an energetic local action is set up, which causes a rapid combination of the alkaline metal with the water in the combining-compartment of the cell.

5 In some cases it is more convenient to fix the carbons to the side of the combining-compartment instead of to the bottom. If the carbons be in metallic contact with the amalgam and also in contact with the water of
10 the combining-compartment, the action is the same in both cases.

Our invention is particularly applicable to cells having a combining-compartment but no combining-circuit. Such a cell as this is
15 seen in Figs. 3 and 4. The decomposing-compartment *h* of this cell consists of a rotating bell *j*, placed within a vessel *k*, the annular space between them forming the combining-compartment *m*. The alkaline-chlorid solution in the decomposing-compartment *h* is kept
20 separate from the alkaline-hydrate solution in the combining-compartment *m* by a layer of mercury *n* on the bottom of the vessel *k*, effecting a seal between the compartments.
25 The carbon anodes *p* project through the bell into oval tubes or openings *q*, (seen in section on the upper half of Fig. 4,) the lower edges of which when the bell is being rotated nearly touch the upper edges of radial ribs *r*, formed
30 on the bottom of the outer vessel *k*, and by these means the amalgam formed in the decomposing-cell under the oval tubes *q* is caused to circulate along the bottom of the cell to the combining-compartment *m*. On
35 the bottom or projecting from the sides of the outer vessel *k* we fix carbons partially metal-coated or of the composition hereinbefore referred to, so that they are in metallic contact with the amalgam and also in contact with
40 the alkaline-hydrate solution. Instead of employing carbon rods *q*, fixed to the bottom or

sides, we may form ribs *t* of the same composition on the bottom of the cell, as shown on the right-hand side of Figs. 3 and 4. The amalgam circulates along the carbons and
45 a rapid combination of the alkaline metal contained in the amalgam with water in the combining-compartment is effected, or loose fragments of carbon prepared in the manner
50 before described may be placed on the surface of the amalgam to effect the same object.

Our invention may be applied in any case where it is desired to increase the rate at which an alkaline metal existing as an amalgam combines with water in the combining-
55 compartment to form alkaline hydrate.

Having now described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. In the electrolytic decomposition of alkaline salts, the herein-described process of increasing the speed with which alkaline metal existing as amalgam combines with water which consists in applying to pieces of carbon a conductive material independent of the
65 amalgam, and then placing of said carbon pieces in contact with the amalgam, substantially as described.

2. In the electrolytic decomposition of alkaline salts, the process of increasing the
70 speed with which alkaline metal existing as amalgam combines with water, consisting in placing small pieces of a combination of carbon and metal filings on the amalgam, substantially as described.

In witness whereof we have hereunto set our hands in presence of two witnesses.

EDWIN EDSER.

MEYER WILDERMANN.

Witnesses:

MATTHEW ATKINSON ADAM,
GEORGE ISAAC BRIDGES.