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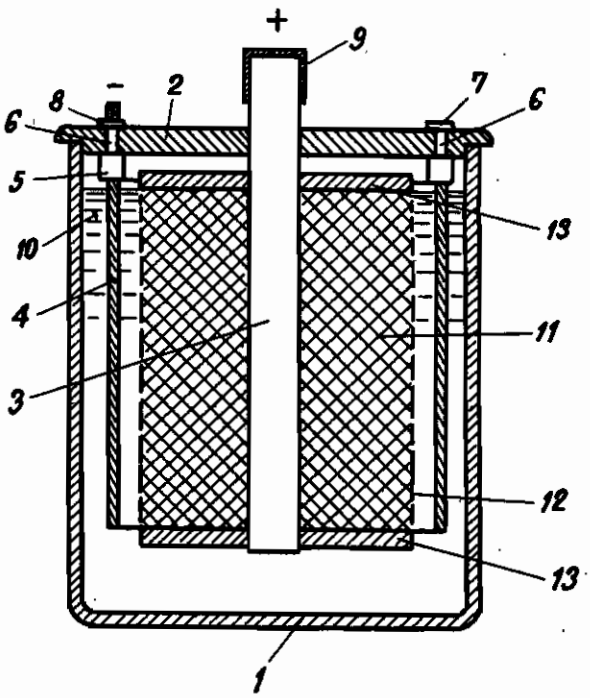

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ELECTRIC CELLS

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This invention relates to means for generating electric energy, more particularly to electric cells of any kind, such as primary or secondary galvanic elements or batteries.

The object of the invention is to improve the known electric cells in such a manner that their polarization should be lowered as far as possible and that the cell shall supply a current of constant voltage and shall have a capacity higher than that of the known electric cells.

It is a well known fact that most of the usual electric cells are polarized after a certain period of use and that consequently their capacity is gradually lowered. The capacity of certain of the known cells is relatively low in itself and is further reduced by polarization. Other types of known cells generate dangerous, unpleasant and unhealthy gases while in action.

Efforts have been made to avoid these drawbacks by using depolarizing means of different kinds, or by altering the construction of the cells or the composition of the materials forming their electrodes and electrolyte. In many cases such suggestions failed to attain the desired effect. For the most part, they rather retarded the chemical processes and this had an unfavorable influence upon the capacity of the cell. Other suggestions, succeeding on obtaining the desired effect, had, however, no practical value, making use of circumstantial or expensive means.

The object of the present invention is to eliminate completely the drawbacks of the known electric cells.

It is known in the art that certain substances are capable to create chemical processes by their presence per se or by using up themselves. On suitable conditions even gases are capable of producing effects which finally are adapted to stop the polarization, to transform or to bind the products causing polarization or to eliminate the formation of injurious gases. The above mentioned gases may have the effect of only assisting the oxidising or reducing chemical processes produced by various depolarising means or agents used in basic or acidic media. The gases, if introduced in a suitable manner into the cell, may catalyze the electrodes or auxiliary bodies arranged around them, they may enter temporarily into the electrodes or auxiliary bodies, being afterwards interchanged with other gaseous substances, they may produce or modify chemical processes or use themselves up.

According to the present invention, the introduction of gases or mixtures of gases corresponding to the nature of the electric cell in question is effected in such a manner that the gases or mixtures of gases are previously absorbed or occluded by the material of the electrodes or auxiliary bodies having the purpose of enlarging the surface of the electrodes and being arranged in contact with or separately from the electrodes side by side or around them. For the purpose of the invention, both as electrodes and as auxiliary bodies, various kinds of carbon, such as retort carbon, charcoal, coke, graphite may be advantageously used. The various kinds of carbon have the further advantage of being inexpensive. The carbon may be used in the form of compressed, compact bodies or of powder or granules. For the absorption of gases other materials of large surface, e. g. finely granulated metals are also adapted.

By using as electrodes the above mentioned substances having in advance absorbed or occluded gases or mixtures of gases or introducing them as auxiliary bodies into the electrolyte, electric cells are produced, which, in comparison to the known electric cells, have an increased and constant voltage, independently from the duration of the load. These cells have further smaller volume and weight than the known ones, in addition to an increased efficiency and a simple construction.

The drawing shows a preferred form of the electric cell according to the invention.

The jar 1 of the cell is closed by a cover 2. The positive carbon electrode is formed by a compressed carbon bar 3 containing occluded or absorbed oxygen, whereas the negative electrode is constituted by an amalgamated zinc cylinder 4. The zinc cylinder is fastened to a bracket 5, having two or more connecting bolts 6, which penetrate the cover 2 and are suspended by heads 7 respectively a nut 8. The nut 8 constitutes one of the terminals, while a metallic cap 8 secured to the carbon bar 3 constitutes the other one. The electrodes are immersed into the electrolyte 10. The compressed carbon bar 3 is surrounded by a body 11 formed by coke granules containing similarly absorbed oxygen. The coke granules are squeezed into a shell, permeable for gases and fluids, e. g. into a perforated cylinder 12, which is closed on both of its ends e. g. by plugs 13 of pitch or the like. The cylinder 12 may be made of any acid- and alkali-proof material, e. g. artificial masses, ebonite, an organdy bag suitably impregnated etc. As electrolyte diluted sulphuric acid may be used in combination with chlorates or bichromates dissolved in it. With such an electric cell I obtain a perfect depolarization, by

which no free gases are developed. Beside bad conducting zinc sulphate, well conducting, easily soluble chlorides or chromates are formed, so that the internal resistance will not be increased.

Experiments have shown that an element of the above kind, having a positive electrode resp. an auxiliary body of carbon e. g. coke granules, prepared according to the present invention and weighing about 300 g., the volume of its electrolyte being 1.9 liter and having a zinc electrode weighing about 202 g. equal to 1.34 g. or in the case of pure zinc, 1.22 g. per ampere-hours, produces an output of 150 ampere-hours of current. As electrolyte, sulphuric acid of 1.12 specific gravity has been used containing 80 g. potassium chlorate, $KClO_3$, per liter. Such an electrolyte may be utilized up to at least 80% of its theoretical capacity. The open voltage of the cell is 1.65 volt which, under a load of 300 milliamperes, falls to 1.33 volt (the cell may also be loaded up to two amperes). Beginning from this point, the voltage remains constant until the end of the capacity of the cell, failing only near to the end of this period in a quite unimportant measure, by 0.04–0.05 volt. Finally, the voltage falls suddenly. The cell may be loaded continually. It may be appreciated that by preparing the carbon in a more perfect manner, the weight of the carbon, and by using a more concentrated electrolyte, the quantity of the electrolyte and in consequence thereof the volume of the cell may be substantially reduced, but, even upon taking into consideration the above data, the volume of the known sal-ammoniacal batteries at equal capacity is larger by 20–25%, their voltage at constant load is lower by 0.25 volt and they can only be loaded with 50 milliamperes. The jar of the cell must not be measured to contain the whole quantity of electrolyte (1.9 liter in the above example) necessary for the whole capacity (150 ampere-hours in the above example), but it may have a smaller volume as well. In this case, the electrolyte must be exchanged after being exhausted.

The above data and explanations have only the object of illustrating the invention without restricting its scope to them. The dimensions of the electric cell according to the invention depend firstly on the desired efficiency, further on the quality, on the density, on the shape (compact or granules) of the carbon and on the composition of the electrolyte.

Instead of oxygen as absorbed or occluded gases other gases, such as nitrogen, hydrogene, ammonia, carbon monoxyd and the like, or a mixture of two or more of these gases according to the requirements set by the chemical process to be attained, may be used.

Such carbons or other materials containing occluded gases, supply a continuous and strong current not only in combination with diluted sulphuric acid and potassium chlorate or sodium chlorate, resp. with potassium bichromate or sodium bichromate, that is to say with compounds rich in oxygen, but also in combination with other chemical substances, such as e. g. diluted hydrochloric acid with sodium sulphate, or a solution of common salt with the addition of ammonium sulphate. In the last named combinations unprepared carbon as ordinarily used generates no current at all.

In the above description by electric cells generally galvanic batteries, dry cells and accumulators are to be understood.

JÓZSEF SZABÓ.