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PROCESS FOR INCREASING THE EFFICIENCY OF STORAGE BATTERIES

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This invention relates to storage batteries, and particularly to a process for increasing the efficiency of storage batteries and improving other qualities thereof which are essential for their operation or charging and discharging.

It is known to add substances to the electrolyte of accumulators for the purpose of influencing certain properties of the electrolyte and thereby of the accumulator so as to improve for instance depolarization and efficiency, to lengthen the life of the plates, to prevent or reduce sulfatization, etc. Although these substances are added in considerable quantities, their effect in producing the desired results has not been satisfactory.

It has been found now that the efficiency can be increased to a surprisingly high degree, that is, more than 20%, by adding to the electrolyte a small amount of a solution of a substance, prepared by dilution in stages, or of a mixture of solutions of different substances, also prepared by dilution in stages.

The dilution of the substance or substances may be carried on to such a degree that the solution, which is to be added in quantities of a few cu. cm. per liter electrolyte, scarcely contains amounts of the addition substance that can be ascertain by chemical methods. The maximum content of solid matter in the final solution is as a rule not higher than 0.001%. The number of dilution stages is of special importance for the effect attained. As the effects of the various stages differ materially from one another, it is necessary empirically to ascertain the stage of dilution producing the optimum effect in each instance, that is, for each particular electrolyte and a certain addition substance.

Particularly favorable effects can be attained in certain circumstances by mixing solutions of different substances each of which has been brought to its optimum dilution stage or power.

Besides the efficiency, other conditions, especially the charging voltage, are improved by such additions. The charging voltage of accumulators having electrolytes treated according to the invention is as a rule about 10% below the normal voltage which would otherwise prevail. This involves not only a saving in the energy required for charging, but insures also a highly desirable constancy of the voltage during charging, which is of special importance when charging and discharging occur in continual alteration as for instance in storage batteries for motor vehicles.

Constancy of the voltage has, moreover, a favorable effect upon the life of the incandescent lamps and connected apparatus which are considerably damaged by the usual over-voltage.

The addition of solutions diluted in stages according to the invention decreases also the gas development in the charged accumulator by considerably reducing the electrolytic decomposition of water. The result is that the destructive influence of the gas deevlopment on the active paste of the negative electrodes is diminished and the life of the latter increased. In further consequence hereof the water need be supplemented less often.

Practically all organic and inorganic substances may be added in the form of solutions highly diluted in stages. The processes to which the action of these substances in certain stages of attenuation or potencies is due may be compared to the dynamization of medicines for homeopathic purposes, which is performed in similar manner by dilution in stages.

It has been found that the water soluble monobasic organic acids of the general formula $C_nH_{2n}O_2$, in a corresponding stage of dilution, are particularly suitable substances, either by themselves or in mixture with attenuated solutions of other, preferably inorganic, substances. Specially suitable among the latter, according to investigations made so far, are those that contain NO_2 ions, since they enhance the effect of most of the addition substances present in the solution diluted in stages.

Special suitability, besides homogeneously composed substances, possess also some extracts from animal or vegetable substances when diluted in stages whose number has to be ascertained in the manner explained.

Experiments have shown that the effect of the substances added according to the invention becomes noticeable only after repeated charging and discharging and usually disappears when the electrolytes treated in the manner described are heated to boiling temperature.

Owing to the improvement of the properties of accumulators by the treatment according to the invention, it is possible in certain circumstances to employ inferior plate material, as aluminum, and still to attain a sufficient output, or, in other words, to produce an accumulator of normal output at a much reduced cost and from more easily obtainable material.

An example of the application of the new process is the following:

2 cu. cm. of an extract of horsetail or scouring rushes (equisetum arvense) diluted to the 14th stage at a ratio of 1:10 are added per liter electrolyte.

A further example is: A corresponding quantity of a mixture of a silver nitrate solution diluted to the 7th stage and of a solution, diluted to the 5th stage, of a water soluble fatty acid is added per liter electrolyte.

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