GOVERNMENT OF INDIA : THE PATENT OFFICE, 214, LOWER CIRCULAR ROAD, CALCUTTA-17.

Specification No. 93159. Application No. 98159, dated 27th February 1965.
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Index at acceptance—14A2[LVIII(1)].

IMPROVEMENTS IN OR RELATING TO THE PREPARATION OF LEAD ACID BATTERY PLATES.

PROVISIONAL SPECIFICATION.

COUNCIL OF SCIENTIFIC AND INDUSTRIAL RESEARCH, RAFI MARG, NEW DELHI 1, INDIA, AN INDIAN REGISTERED BODY INCORPORATED UNDER THE REGISTRATION OF SOCIETIES ACT (ACT XXI OF 1860)

The following specification describes the nature of this invention.

This is an invention by HANDADY VENKATAKRISHNA UDUPA, SRINIVASA SAMPATH, RAMESH CHANDRA, SUBBIAH PALANICHAMY and CHAKKALAKKAL JACOB JOHNY, all of the Central Electrochemical Research Institute, Karaikudi, Madras, India, all Indians.

This invention relates to the improvements in or relating to the preparation of plates for lead-acid batteries with a view to improve their performance generally and also at sub-zero temperatures.

Hitherto, it has been proposed to use lead-acid batteries of conventional make with sulphuric acid (of sp.gr. 1.285-1.290) for meeting the various power needs at all temperatures. The positive plates or electrodes are made by mixing oxides of lead and sulphuric acid into a paste and applying the same on antimonial lead grids. The negative plates contain besides oxides of lead and sulphuric acid, the conventional expanders like carbon black and barium sulphate.

This is open to objection in that, at very low temperatures, the capacity output of the batteries drops considerably with the result that the devices employing such batteries function inefficiently or become inoperative.

The object of this invention is to obviate these disadvantages by modifying the procedures for the preparation of the positive and negative electrodes by suitably altering the composition of the respective pastes for the two plates for application on to the grids.

To these ends, the invention broadly consists in adding organic materials such as lignosulphonic acid, benzidine sulphate and the like to the negative paste 0.05% to 1.0% by weight (of the oxides of lead used in the mix) and/or adding carbon black to the extent of 0.05 to 0.65% of the oxides used in the positive paste. These additions have a profound effect on increasing the capacity of the assembled batteries at all temperatures, particularly at sub-zero temperatures.

The following typical examples are given to illustrate the invention:

EEAMPLE 1

	Conventional negative plate	Negative plate according to the improved method
1. Composition of the paste	10% Red lead (Pb_3O_4) 90% litharge (PbO) 0.3% barium sulphate and 0.15% carbon black	10% Red lead (Pb_3O_4) 90% Litharge (PbO) 0.3% barium sulphate 0.15% carbon black, and 0.5% lignosulphonic acid.
2. Capacity when discharged at 0.63 amp/dm² at 28°C (corresponding to 20 hr rate)	17.3 amp-hrs	20.2 amp-hrs
3. Capacity when discharged at 11.5 amp/dm² at 28°C (corresponding to high rate discharge)	4.20 amp-hrs	10.76 amp-hrs
4. Capacity when discharged at 11.5 amp/dm² at 5°C	1.52 amp/hrs	5.9 amp-hrs

EXAMPLE 2

	Conventional positive plate	Positive plate according to the improved method
1. Composition of the paste	60% Red lead 40% Litharge	60% Red lead 40% Litharge 0.25% Carbon black
2. Capacity at 30°C when discharged at 0.63 amp/dm²	11.27 amp-hr	13.18 amp-hr
3. Capacity at 5°C when discharged at 0.63 amp/dm²	5.47 amp hr	10.01 amp-hr

The following are among the main advantages of the invention:

(a) The use of the addition agents increases the power output of the battery by facilitating the participation of the active material in the chemical reactions in a more effective way.

(b) This increase in capacity is particularly noticeable when the battery is operated at low temperatures.

(c) The high rate discharge of batteries made with either the positives or the negatives made as described here along with the other conventional plate is much

superior to that obtained with only the conventionally made plates.

(d) High rate discharge of batteries made using combinations of these positive and negative plates is also very much superior to what is obtained with batteries having conventional plates.

R. BHASKAR PAI
Scientist,
COUNCIL OF SCIENTIFIC & INDUSTRIAL RESEARCH.

Dated this 19th day of February 1965.

COMPLETE SPECIFICATION.

COUNCIL OF SCIENTIFIC AND INDUSTRIAL RESEARCH, Rafi Marg, New Delhi 1, India, an Indian registered body incorporated under the Registration of Societies Act (Act XXI of 1860)

The following specification particularly describes and ascertains the nature of this invention and the manner in which it is to be performed.

This is an invention by HANDADY VENKATAKRISHNA UDUPA, SRINIVASA SAMPATH, RAMESH CHANDRA, SUBBIAH PALANICHAMY and CHAKKALAKKAL JACOB JOHNY, all of the Central Electrochemical Research Institute, Karaikudi, Madras, India, all Indians.

This invention relates to the improvements in or relating to the preparation of plates for lead-acid batteries with a view to improve their performance generally and also at sub-zero temperatures.

Hitherto, it has been proposed to use lead-acid batteries of conventional make with sulphuric acid (of sp.gr. 1.285-1.290) for meeting the various power needs at all temperatures. The positive plates or electrodes are made by mixing oxides of lead and sulphuric acid into a paste and applying the same on antimonial lead grids. The negative plates contain besides oxides of lead and sulphuric acid, the conventional expanders like carbon black and barium sulphate.

This is open to objection in that, at very low temperatures, the capacity output of the batteries drops considerably with the result that the devices employing such batteries function inefficiently or become inoperative.

The object of this invention is to obviate these disadvantages by modifying the procedures for the preparation of the positive and negative electrodes by suitably altering the composition of the respective pastes for the two plates for application on to the grids.

To these ends, the invention broadly consists in adding organic materials such as lignosulphonic acid, benzidine sulphate and the like to the negative paste 0.05% to 1.0% by weight (of the oxides of lead used in the mix) and/or adding carbon black to the extent of 0.05 to 0.65% of the oxides used in the positive paste. These additions have a profound effect on increasing the capacity of the assembled batteries at all temperatures, particularly at sub-zero temperatures.

The following typical examples are given to illustrate the invention:

EXAMPLE 1

	Conventional negative plate	Negative plate according to the improved method
1. Composition of the paste	10% Red lead (Pb_3O_4) 90% Litharge (PbO) 0.3% barium sulphate and 0.15% carbon black	10% Red lead (Pb_3O_4) 90% Litharge (PbO) 0.3% barium sulphate 0.15% carbon black, and 0.5% lignosulphonic acid.
2. Capacity when discharged at 0.63 amp/dm² at 28°C (corresponping to 20 hr rate)	17.3 amp-hrs	20.2 amp-hrs
3. Capacity when discharged at 11.5 amp/dm² at 28°C (corresponding to high rate discharge)	4.20 amp-hrs	10.76 amp-hrs
4. Capocity when discharged at 11.5 amp/dm² at 5°C	1.52 amp-hrs	5.9 amp-hrs

EXAMPLE 2

	Conventional positive plate	Positive plate according to the improved method.
1. Composition of the paste	60% Red lead 40% Litharge	60% Red lead 40% Litharge 0.25% Carbon black
2. Capacity at 30°C when discharged at 0.63 amp/dm²	11.27 amp-hr	13.18 amp-hr
3. Capacity at 5°C when discharged at 0.63 amp/dm²	5.47 amp-hr	10.01 amp-hr

The following are among the main advantages of the invention:

(a) The use of the addition agents increases the power output of the battery by facilitating the participation of the active material in the chemical reactions in a more effective way.

(b) This increase in capacity is particularly noticebale when the battery is operated at low temperatures.

(c) The high rate discharge of batteries made with either the positives or the negatives made as described here along with the other conventional plate is much superior to that obtained with only the conventionally made plates.

(d) High rate discharge of batteries made using combinations of these positive and negative plates is also very much superior to what is obtained with batteries having conventional plates.

We claim:

1. A process for the preparation of lead acid battery plates which comprises adding organic materials such as lignosulphonic acid, benzidine sulphate or the like to the negative paste 0.05% to 1.0% by weight (of the oxides of lead used in the mix) and/or adding carbon black to the extent of 0.05 to 0.65% of the oxides used in the positive paste.

2. A process for the preparation of lead acid battery plates substantially as described in the examples.

3. Lead acid battery plates whenever obtained according to a process substantially as hereinbefore described.

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Dated this 15th day of November 1965.

MGIP Sant.—SL—7 Patent/67—15-2-68—100.