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PROVISIONAL SPECIFICATION No. 17319 A.D. 1946.

Improvements in Electric Secondary Batteries

I, CHARLES GEORGE SMITH, a British Subject, of 363, Station Road, Dorridge, in the County of Warwick, do hereby declare the nature of this invention to be as follows:—

This invention relates to secondary batteries and is applicable to batteries of the kind wherein the negative plates are made of zinc or the surfaces of the negative plates which are immersed in the electrolyte, are coated with zinc.

It has been found in connection with such batteries and particularly when the positive plates consists of lead grids loaded with lead oxide, there is a danger for the lead or lead compounds to pass from the positive plate and to become plated on the negative plate.

The object of the present invention is to overcome this difficulty and according to the present invention the positive plates or those parts of them which are immersed in the electrolyte are totally enclosed by an envelope of jelly acid.

Further, the positive electrode with its enclosing envelope of jelly acid may be enclosed in an outer porous housing.

The positive plates usually comprise a rectangular portion which is immersed in the electrolyte and at the top the plates are each provided with a projecting lug of less width than the rectangular portion, to which lug one of the conductors is secured and in carrying the invention into effect the larger portion of the plate and in effect the whole of the portion of the plate which is immersed in the electrolyte, is totally enclosed in an envelope of jelly acid.

The positive plate may be placed in a porous housing which may be made of

wood fabric such as cotton webbing or porous ceramic material and the jelly acid is poured into the housing and sets into the form of a jelly and occupies the space, between the housing and the positive plate.

The envelope of jelly acid encloses not only the flat surfaces of the plate but also all the edges and the outer housing may also extend completely around the surface of the jelly acid.

On the outer side or both sides of the housing, the housing may be provided with ribs or projections which act as spacers and the negative plates which may be made of zinc, may be immersed in the electrolyte in contact with these projections or ribs.

The material of the outer housing is non-conducting and porous and it has been found that wood or cotton webbing or porous ceramic material can be used successfully as they are not affected by the acid electrolyte except when in the presence of air.

The jelly acid may be made by using a suitable acid such for instance as sulphuric acid to which waterglass has been added.

The projecting lug of the positive plate may be protected by a suitable adhering coating of material such for instance as enamel.

Dated the 4th day of June, 1946.

FORRESTER, KETLEY & CO.,

Chartered Patent Agents,

Central House, 75, New Street,

Birmingham, 2, and

Jessel Chambers, 88/90, Chancery Lane, London, W.C.2.

PROVISIONAL SPECIFICATION No. 24748. A.D. 1946.

Improvements in Electric Secondary Batteries

I, CHARLES GEORGE SMITH, a British Subject, of 363, Station Road, Dorridge, in the County of Warwick, do hereby
[Price 2/-]

declare the nature of this invention to be as follows:—

This invention relates to secondary

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batteries and is applicable to batteries of the kind wherein the negative plates are made of zinc or the surfaces of the negative plates which are immersed in the electrolyte, are coated with zinc.

It has been found in connection with such batteries, particularly when the positive plates consisting of lead grids loaded with lead oxide, that there is a danger that the lead or lead compounds may pass from the positive plate and become plated on to the negative plate.

The object of the present invention is to overcome this difficulty and according to the present invention the positive plates or those parts of them which are immersed in the electrolyte are totally enclosed by the electrolyte which is in the form of a jelly acid, and the negative plates are immersed in the electrolyte and contained and enclosed in a porous housing.

In carrying the present invention into effect the positive plates, which may comprise each a rectangular portion which is immersed in the electrolyte and a projecting integral lug of less width than the rectangular portion, to which lug one of the conductors is secured, and has its major portion totally enclosed in an envelope of jelly acid while the negative plate, which may consist of zinc or other metal coated with zinc, is immersed in liquid electrolyte within a casing of porous material such as wood, fabric

such as cotton webbing, or porous ceramic material.

The cell or battery comprises an outer case containing a compartment made of the porous material or partly made of said porous material, and the negative plate is placed in this compartment and the compartment is filled with liquid electrolyte.

The positive plate is mounted in the battery casing outside the compartment and is enclosed in an envelope of jelly acid.

The outer side or sides of the compartment or porous housing for the negative electrode is or are preferably provided with ribs or projections which act as spacers.

The jelly acid in which the positive electrode is enclosed may be made by using an acid such for instance as sulphuric acid to which waterglass has been added.

The projecting lug of the negative electrode or plate may be protected by an adhering coating of material such as enamel.

Dated the 15th day of August, 1946.

FORRESTER, KETLEY & CO.,

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COMPLETE SPECIFICATION

Improvements in Electric Secondary Batteries

I, CHARLES GEORGE SMITH, a British Subject, of 363, Station Road, Dorridge, in the County of Warwick, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to secondary batteries of the kind wherein the negative plates are made of zinc or the surfaces of the negative plates which are immersed in the electrolyte are coated with zinc.

It has been found in connection with such batteries, particularly when the positive plates consist of lead grids loaded with lead oxide, that there is a danger that the lead or lead compounds may pass from the positive plate and become plated on to the negative plate.

The object of the present invention is to overcome this difficulty and, according to the present invention, the positive plates or those parts of them which are immersed in the electrolyte are totally

enclosed by an envelope of jelly acid, and the negative plates are immersed in the electrolyte and so far as communication with the positive plates is concerned are contained and enclosed in a porous housing.

Further, the positive plate with its enclosing envelope of jelly acid may be enclosed in an outer porous housing.

The battery case may be provided with internal ribs extending along the base and up opposite side walls of the case, said ribs being provided with longitudinal grooves for receiving the edges of the positive and negative plates.

Plates of porous material, which may be made of wood, fabric such as cotton webbing or porous ceramic material, may be spaced in-between the internal ribs and between the outermost ribs and the sides of the battery case so as to divide the case into separate compartments.

Alternatively, the internal ribs may be provided with further grooves for receiving and holding the plates of porous material so as to form separate compart-

ments for the positive plates and adjacent ribs may be provided with similar opposed notches forming grooves for receiving and holding the negative plates.

5 The invention is illustrated in the accompanying drawings, wherein:—

Figure 1 is a section in side elevation of a secondary battery constructed in accordance with the present invention;

10 Figure 2 is a section on line 2—2 in Figure 1;

Figure 3 is a section in plan on the line 3—3 in Figure 2.

Figure 4 is a section in plan of another form of the invention;

Figure 5 is a fragmentary sectional side elevation of a further form of the invention;

Figure 6 is fragmentary section in side elevation showing a detail of construction.

In the construction shown in Figures 1 to 3, the battery comprises an outer case 10 of insulated material containing two positive plates 11, 11, a negative plate 12 and suitable electrolyte 13.

The negative plate 12 consisting of zinc or other metal coated with zinc, comprises a rectangular portion 14 which is immersed in the electrolyte and a projecting integral lug 15, to which lug one of the conductors is secured. The positive plates 11, 11 are of similar shape.

On the inside the case is divided into three compartments by means of three ribs 16 which extend across the base and up opposite sides of the case and which have grooves running along their length for receiving the bottom and side edges of the positive and negative plates so as to hold the plates inside the case in substantially vertical planes. Spaced intermediate the ribs and between the outer ribs and the side walls of the case are plates 17 of porous material such as wood, fabric such as cotton webbing, or porous ceramic material, so that in effect the battery case is divided into three separate compartments.

The jelly acid 18 is poured into the two outer compartments and sets into the form of a jelly completely surrounding the positive plate in each compartment, and the top of the compartment is sealed with a strip 19 of insulated material having a slot in it through which projects the terminal lug 20 of the positive plate.

The electrolyte 13 fills the inner compartment surrounding the negative plate and has its free surface 21 somewhat above the top edges of the three compartments.

In the construction as shown in Figure 4, three compartments are provided in the battery case, but the two outer compart-

ments are spaced inward from the wall of the case. Two ribs 16 are provided extending along the base and up opposite side walls of the compartment and each rib has three grooves along its length and in spaced relationship, the central groove in each rib having a positive plate engaged in it and plates 17 of the porous material being held in the outer grooves in each rib. On its inner edge 22 each rib has a notch so that when the ribs are placed together in the case a central groove is formed into which groove fits the negative plate.

The construction shown in Figure 5 has one rib 16, having a groove for receiving the negative plate, and plates of porous material 17 on each side of this rib. The jelly acid is contained in the two outer compartments so formed, completely surrounding the positive plates 11, 11.

In both these latter constructions the top of each compartment containing a positive plate can be sealed with a strip 19 of insulated material, as in Figure 2.

The jelly acid used can be made by using an acid such, for instance, as sulphuric acid to which waterglass has been added, and the terminal lugs of the positive and negative plates may be protected by an adhering coating of material such as enamel.

The internal ribs may be formed integral with the case 10 or made as separate units for assembling and inserting in the case, and the porous plates surrounding the negative plate are preferably provided with ribs or projections (not shown) on the sides adjacent the negative plate, which ribs act as spacers for retaining the negative plate in an upright position.

Figure 6 shows a detail of construction of the positive plates. The plates are provided with integral lugs 23 which engage in the grooves in the ribs and allow the jelly acid to completely surround the side and bottom edges of the plate.

Having now particularly described and ascertained the nature of my said invention an in what manner the same is to be performed, I declare that what I claim is:—

1. A secondary battery of the kind referred to, wherein the positive plates or those parts of them which are immersed in the electrolyte are totally enclosed by an envelope of jelly acid and the negative plates are immersed in the electrolyte and so far as communication with the positive plates is concerned are contained and enclosed in a porous housing.

2. A secondary battery according to Claim 1, wherein the positive plate with its enclosing envelope of jelly acid is enclosed in a porous housing.

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3. A secondary battery according to Claims 1 and 2, wherein the battery case is provided with internal ribs extending along the base and up opposite side walls of the case, said ribs being provided with longitudinal grooves for receiving the edges of the positive and negative plates.
4. A secondary battery according to Claim 3, wherein plates of porous material are spaced in-between the internal ribs and between the outermost ribs and sides of the battery case so as to divide the case into separate compartments.
5. A secondary battery according to Claim 3, wherein the internal ribs are provided with further grooves for receiving and holding plates of porous material so as to form separate compartments for the positive plates and adjacent ribs are provided with similar opposed notches forming grooves for receiving and holding the negative plates.
6. A secondary battery constructed substantially as described and shown in Figures 1, 2, 3 and 6 of the accompanying drawings.
7. A secondary battery constructed substantially as described and shown in Figure 4 of the accompanying drawings.
8. A secondary battery constructed substantially as described and shown in Figure 5 of the accompanying drawings.

Dated the 22nd day of May, 1947.

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[This Drawing is a reproduction of the Original on a reduced scale.]

