

(No Model.)

F. O. NORTON.
SECONDARY BATTERY.

No. 499,848.

Patented June 20, 1893.

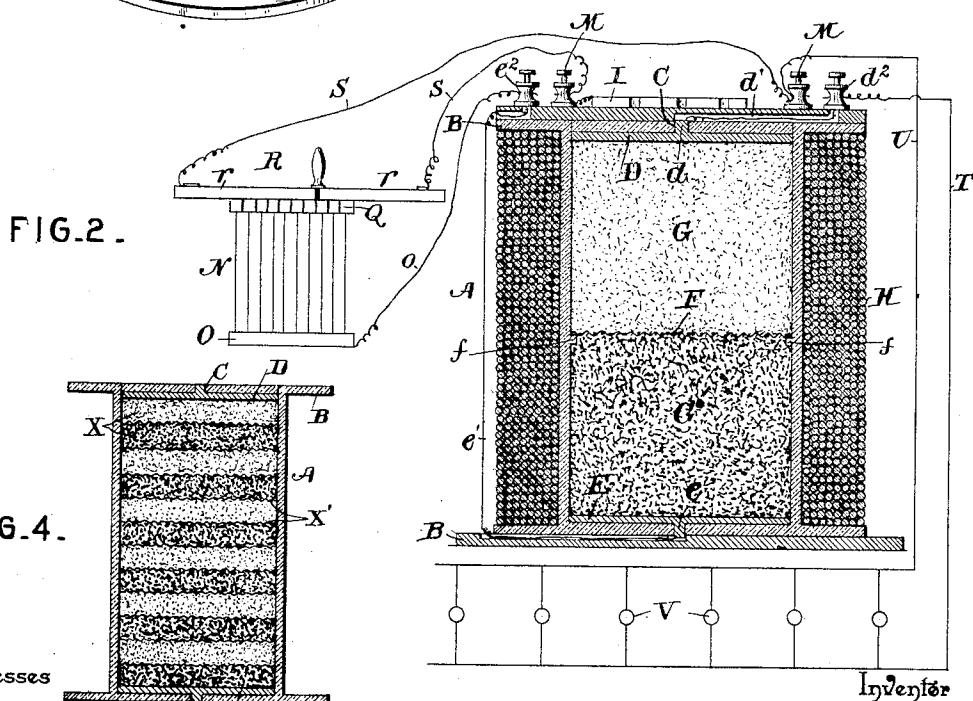
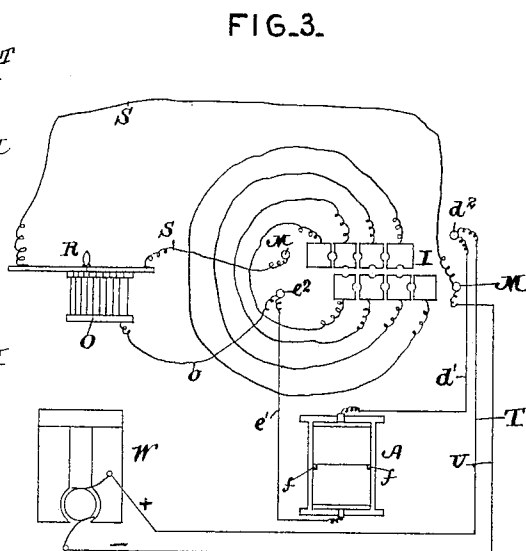
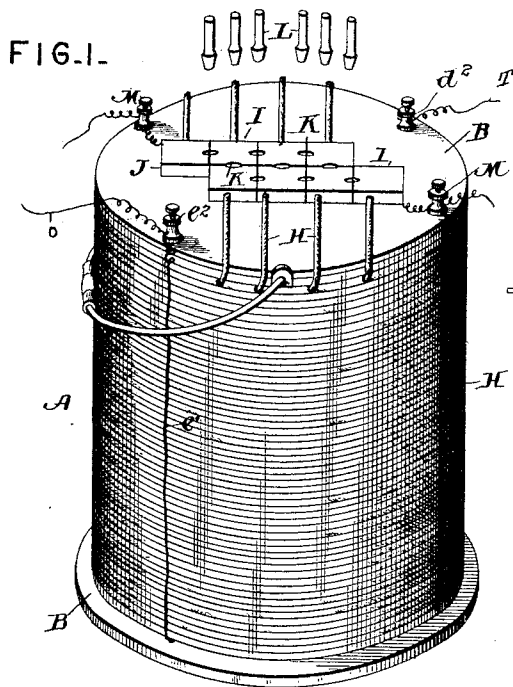


FIG. 4.

Witnesses

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UNITED STATES PATENT OFFICE.

FRED OTTO NORTON, OF OROVILLE, CALIFORNIA.

SECONDARY BATTERY.

SPECIFICATION forming part of Letters Patent No. 499,848, dated June 20, 1893.

Application filed May 26, 1892. Serial No. 434,470. (No model.)

To all whom it may concern:

Be it known that I, FRED OTTO NORTON, a citizen of the United States, residing at Oroville, in the county of Butte and State of California, have invented a new and useful Secondary Battery, of which the following is a specification.

This invention relates to secondary batteries; and it has for its object to provide an improved secondary or storage battery which shall be so constructed as to be readily and fully charged, while at the same time so constructed as to readily discharge the current in quantities regulated to suit requirements.

To this end the main and primary object of the invention is to generally improve upon the construction of secondary or storage cells.

With these and many other objects in view which will readily appear as the nature of the invention is better understood, the same consists in the novel construction, combination and arrangement of parts hereinafter more fully described, illustrated and claimed.

In the accompanying drawings:—Figure 1 is a perspective view of a battery constructed in accordance with this invention. Fig. 2 is a vertical longitudinal section of the same. Fig. 3 is a diagrammatic view illustrating the cell and switch and coil connections. Fig. 4 is a detail sectional view of a modification of the cell.

Referring to the accompanying drawings:—A represents a closed hollow glass or porcelain cylinder, provided with the upper and lower encircling annular flanges B, and the top and bottom central perforations C, located in the upper and lower ends of said cylinder. Within the top of the glass or porcelain cylinder A is placed the upper copper disk D, fitting the interior of said cylinder and provided with a central projecting contact teat or plug d closely fitting within the upper central perforation in the top of the cylinder A, and connected by the conducting wire d' , with the binding post d^2 forming one terminal of the battery. Directly opposite the upper copper disk D and fitting tightly in the bottom of the cylinder A is the lower iron disk E, also provided with a connecting teat or plug e , closely fitting in the lower perforation of the cylinder to form an air tight

joint and connected by the connecting wire e' with the binding post e^2 forming the other terminal of the battery. Centrally between the upper and lower metallic disk is interposed the central separating wire screen or perforated plate F resting on the inner annular shoulder f , formed integral with and within the glass cylinder. The said separating screen supports the upper stratum G of the sub-oxide of copper, which is placed within the cylinder in contact with the upper copper disk or plate in a dry and porous condition, while below the central division diaphragm F, and in contact with the lower iron contact plate E is the lower stratum G', of sodium hydrate placed in the cylinder in a partly dry or pasty condition. Although cuprous oxide and sodium hydrate are employed to cause the requisite chemical action within the battery, nevertheless it will be readily seen that various similar substances may be substituted therefor without departing from the spirit of this invention for any suitable hydrous or hydrated alkali oxide combined with an anhydrous metallic oxide may be used, where the metal of one has strong affinity for the oxygen it contains, while the other substance employed has but slight affinity therefor, so that when under an electric current, the oxygen is taken from the metal having the strongest affinity for the same and transferred to that having weaker affinity for the same. The oxygen will quickly return to that having the strongest affinity, when the conditions which originally released the same have been removed. The oxides of sodium, lithium, potassium, &c., may therefore be used for one part of the battery while the oxides of lead or copper, or platinum sponge or black, &c., for the other part of the battery.

Surrounding the hollow glass cylinder A between the upper and lower flanges B of the same are the separate resistance coils H, wound therearound so as to provide for offering the proper resistance to the distributed current from the battery, and therefore evenly modifying and regulating the proper distribution of the current by presenting variable resistances to the current when the cell is discharging. The ends of each coil H are connected alternately to opposite switch

plates or blocks I, arranged upon the wooden top of the cell and insulated from each to form the main switch J, while between the parallel blocks or plates and between those of each set are formed the plug openings K, which receive the switch plugs L adapted to be inserted in said openings so as to pass the electric current through the separate coils in parallel, in series, or part in parallel and part in series as will be readily understood by those skilled in the art, so that the variable resistances may be caused within the coils so that the discharge of the electric current from the cell may be controlled. The opposite end plates of the switch J are connected with the opposite switch binding post terminals M.

To more fully control and regulate the discharge of the battery a supplemental or auxiliary switch N is interposed in the circuit. The switch N is provided with a lower fixed switch plate or rod O, which is connected by the wire o with the binding post e^2 connected with one of the cell wires, and arising from said fixed switch rod are a series of switch wires P each of which is connected at its upper end to one of the series of switch plates Q, insulated from each other and supporting the sectional sliding switch bar R. The said sliding switch bar comprises the opposite members r insulated from each other and slid over the series of switch plates, and each of said switch bars are connected by the wires S with one of the switch binding posts of the coils switch, respectively, so that according to the position that the bars r occupy over the switch plates Q, and according to the number of said plates either of said bars are in contact with or cover, very little, none, or any strength of current is passed to the coils switch and through the coils, in order to accurately control the discharge from the cell. The said cell may be charged through the wires T and U connected with the binding post d^2 and one of the binding posts M of the switch J, and when discharging, the same wires may be connected with a series of electric lights V as illustrated in Fig. 2 or with a motor W as illustrated in the diagrammatic view according to the use in which the battery is placed, or when charging the same, is connected with a generator W similar to the connection shown in said diagrammatic view.

In charging the cell the current in passing into the same, decomposes the caustic soda or other alkali within the same, and causes the oxygen and hydrogen thereof to be transferred to the copper salt, producing a hydrated oxide of copper and leaving metallic sodium. After the cell has been completely charged so that the exchange of elements therein is completed, the cell is ready to be discharged. When discharging, the great affinity of the alkali metal comes into play and withdraws its lost elements from the copper or other metal, and causes a reverse chemical reaction to set in which immediately produces the current from the cell, which passing through the

switches and the coils surrounding the cell, if desired may be controlled in amount by the varying resistances in said coils.

In the modification of the cell illustrated in Fig. 4, instead of employing a single stratum of the alkali and other metallic salt, I there employ an alternate series of such strata as illustrated at X in said figure, in which construction I of course interpose a series of diaphragm plates X', to correspond to the plate F already described, and by such construction of battery the capacity of the same is greatly enlarged. Many advantages will readily suggest themselves to those skilled in the art.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a secondary battery, a cylindrical vessel closed at top and bottom, metallic battery disks or plates arranged within the top and bottom of said vessel and connected with the battery wires, a hydrated alkaline oxide within said cylinder in contact with one of said plates and an anhydrous metallic substance adjacent to the hydrated oxide and contacting with the other metallic disk or plate, substantially as set forth.

2. In a secondary battery, a closed non-conducting cylinder, metallic battery plates arranged within the top and bottom of said cylinder and connected with the battery wires, separate strata of hydrated alkaline oxide and anhydrous metallic substances diaphragmed from each other and connected with opposite battery plates, and resistance coils surrounding said cylinder and in the circuit of said battery wires, substantially as set forth.

3. In a secondary battery, a closed non-conducting cylinder having top and bottom perforations, top and bottom metallic battery plates provided with projecting plugs fitting in said perforations and connected with the battery wires, a horizontal screen diaphragm within said cylinder, a hydrated alkaline oxide placed on one side of said diaphragm and contacting with one of the battery plates, and an anhydrous metallic substance on the other side of said diaphragm and contacting with the other battery plate, substantially as set forth.

4. In a secondary battery, a closed non-conducting cylinder, battery plates within the top and bottom of said cylinder and connected with the battery wires, separate strata of a hydrated alkaline oxide and an anhydrous metallic substance diaphragmed from each other and contacting with opposite battery plates, and a series of separate and independent resistance coils surrounding the cylinder and in the circuit of the battery wires, substantially as set forth.

5. In a secondary battery an air tight non-conducting cylinder having the top and bottom annular flanges, the top and bottom battery plates and interposed chemicals connected in circuit with the battery wires, separate and independent coils surrounding the

circuit between the flanges, and a switch arranged within the circuit of the battery wires and receiving the terminals of the separate coils of wires to vary the resistance thereof, substantially as set forth.

5 6. In a secondary battery, an air-tight non-conducting cylinder, the top and bottom battery plates and interposed chemicals connected in circuit with the battery wires, separate and independent coils surrounding the
10 cylinder, a switch arranged within the circuit of the battery wires and receiving the terminals of the separate coils to vary the resist-

ance thereof, and an auxiliary switch connected in circuit with the main switch and
15 the battery wires to regulate the current from the battery to the coils, substantially as set forth.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in
20 the presence of two witnesses.

FRED OTTO NORTON.

Witnesses:

CHARLES S. TOPPING,
MARIA L. BOSLEY.