Oct. 29, 1929. J. S. CROSSLEY 1,733,866

PROCESS OF FORMING ELECTRODES

Filed Nov. 26, 1926

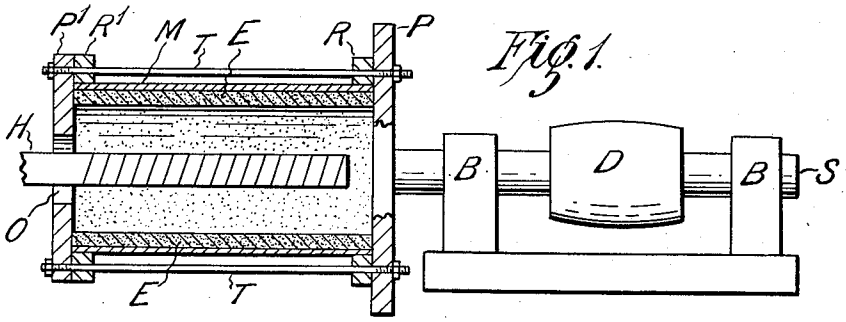


Fig. 1.

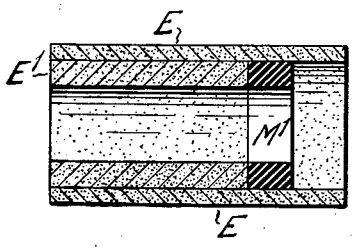


Fig. 2.

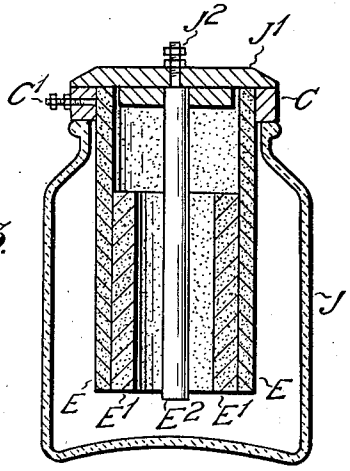


Fig. 3.

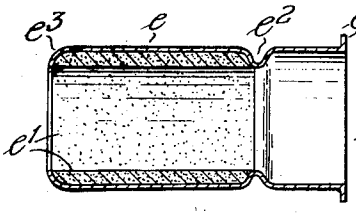


Fig. 4.

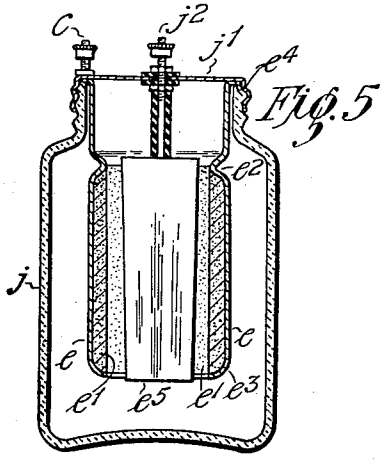


Fig. 5.

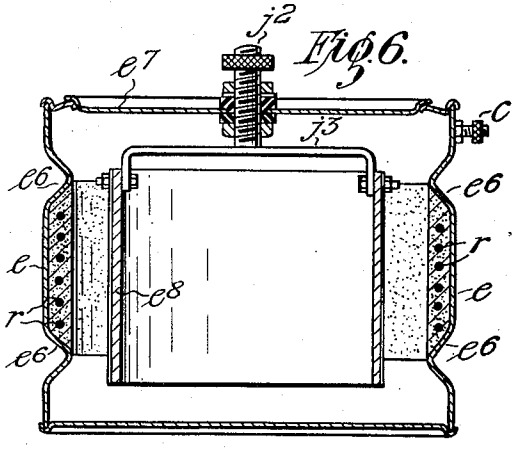


Fig. 6.

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Attys

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1,733,866

UNITED STATES PATENT OFFICE

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PROCESS OF FORMING ELECTRODES

Application filed November 26, 1926, Serial No. 150,955, and in Australia December 1, 1925.

The objects of this invention include the production of improved primary cells for which purpose I employ a new process. These improved cells have higher electromotive force than any others I know of similar type and are more durable, and relatively cheaper. One characteristic of the invention is that the depolarizing compounds are located so as to secure increased efficiency.

In my cell one electrode has the form of a cylinder and relatively thereto the other electrode, which is of any suitable form, is supported in any suitable manner. The condition of the particles of the matter composing the cylindrical electrode, is one of particularly close association,—more so than if they were consolidated by ordinary pressure, or by flow moulding, and yet the particles are not crushed or disintegrated to effect consolidation. To attain the improved relationship of the particles I locate them centrifugally.

In known wet cells, a carbon cylindrical element is employed having a depolarizer, within which is a retaining wall, but in my construction such a wall is not required.

I describe my invention herein with the aid of the accompanying drawings, but the forms illustrated are examples only, as other useful forms are producible while keeping within the scope of what is hereinafter claimed.

In the drawings Figure 1 is a side view, partly in section, of a moulding machine carrying a mould, part of an electrode being shown therein.

Figure 2 is a longitudinal section of an electrode having a depolarizer deposited therein, and shows also a temporary moulding ring for locating the depolarizer.

Figure 3 is a sectional view of a cell embodying the electrode of Figure 2.

Figure 4 is a longitudinal section of an electrode for another type of cell.

Figure 5 is a sectional view of a cell embodying the electrode of Figure 4.

Figure 6 is a sectional view of a cell in which the electrode forms the cell casing.

Machines for depositing plastic material centrifugally to form concrete pipes and other articles for example are well known, and I use any suitable centrifugal moulding machine, that shown in Figure 1 being an example. It has a shaft S carried in bearings B, and has a drive pulley D. At one end of the shaft is a plate P which by means of connecting rods supports a plate P^1 having a feed opening O. The rods T carry end rings R, R^1 adapted to locate an element in which a layer of material is to be deposited and consolidated; such an element is for example a mould M. In some cases I make the mould of easily destructible non-absorbent material, for example cardboard coated or impregnated with a suitable substance such as paraffin wax or oil. When the mould body is of material which is not to be destroyed, I utilize it as a cell exterior which may be an electrode.

In Figures 4 to 6 the electrode is suitably made as by spinning sheet metal.

When the element to be moulded contains carbon, such as powdered coke, retort carbon, or carbonized lignite, with or without graphite, I mix such material with a binder and liquid producing a mixture of suitable consistency, for example about that of cream. Binders may vary, the material used being adapted to allow of the herein described baking or other subsequent treatment of the moulded element.

I bake the cylinder in some cases, and in those cases the binder may be flour and/or molasses and water, oil, or tar. When I do not bake the cylinder a suitable binder is 1% solution of grass tree resin in a solvent, alcohol being suitable.

My cylindrical electrode is in some cases impervious to moisture, its material being finely ground, to pass for example through a sieve of 180 meshes to the lineal inch. Such an electrode withstands contact with liquid, and I use it in some cases as a cell casing. I utilize one form of my cylinder within a casing in which arrangement porosity of the cylinder is optional and in some circumstances is desirable. A porous cylinder is used by me for example as a substitute for an ordinary porous pot of a known double fluid cell. To make porous cylinders the car-

bonaceous material is less finely ground, to pass for example through a sieve having about 50 meshes to the lineal inch. One mixture I employ to produce a cylinder contains ground coke, 8 parts, flour 1 part, molasses 1 part, and enough water to produce suitable consistency.

Sufficient of the mixture is fed into the mould which is then revolved at suitable speed, or the material is fed into a rotating mound, with the result in each case that a wall E of the thickness desired is centrifugally produced.

During the moulding I apply heat to the mould interior or the inner surface of cylindrical wall E in some cases for a short period, and for this purpose an electric heating element H is effective. Such heating produces on the moulded matter a hardened interior surface or skin.

When the material is sufficiently consolidated the rotation is stopped, and the mould with its contained cylinder is removed. When the mould is to be consumed by heat the latter with its contained cylinder is baked as by being placed in a stove or kiln and raised to about red heat so that the mould or casing becomes charred and destroyed, this procedure avoiding that deformation of the cylinder which some other casings would produce.

When the cylinder is to contain as an internal layer or facing a solid or plastic depolarizer, I place a temporary mould ring M^1 in the cylinder, set the latter in a moulding machine, and then deposit a depolarizer E^1 centrifugally, ensuring close association of the depolarizer with the electrode and increasing the efficiency of the cell.

As shown in Figure 3 an element E having an internal depolarizer E^1 is usable instead of a porous pot in a cell of Leclanché type. J is a jar enclosing a cylindrical electrode E, which is supported, suitably by means of for example, a collar C to which a terminal C^1 is attached.

The other electrode E^2 is supported about centrally of the cylindrical electrode, by a cover J^1 which carries the terminal J^2.

In cells in which the cylindrical electrode is of metal, such as copper or metal coated with copper, I centrifugally deposit a depolarizing lining comprising metallic oxide, for example copper oxide, with other suitable material, as graphite and a binder. Any suitable binding is usable as whiting and silicate of soda or I add magnesium chloride or ferric chloride to the oxide, and heat to form an insoluble oxy-chloride. Suitable proportions of these ingredients are known in the art.

In Figures 4 and 5, e, is a metal electrode. This is placed in a moulding machine and the deplorarizer e^1 is deposited centrifugally, a rib e^2, and an inturned end e^3, locating and preventing displacement of the depolarizer. Immediately after the depolarizer is deposited it is advantageous to bake and set it at a temperature of or above for example 450 degrees. To prevent undesirable absorption from the atmosphere, the container j carries a suitable, as an air-tight metallic, cover or lid j^1, which contacts with a flange e^4 of electrode e and carries a terminal c, and also carries insulated from it a rod electrode e^5 of suitable material, as zinc, on a stem having a terminal j^2.

In Figure 6, the cell casing is a cylindrical electrode e which carries a centrifugally deposited depolarizer e^1, located by casing walls e^6.

As a reinforcement and conductor, I use at will suitable means within the depolarizer as metallic wire r. e^7 is an air tight lid having insulated from it a terminal stem j^2 to carry a frame j^3 on which is an inner cylindrical electrode e^8, of suitable material as zinc centrifugally formed, in some cases.

It will be evident that to easily produce an inert cell the foregoing information will suffice to those who are skilled in the art. Such cells are within the ambit of this invention.

I claim:

1. The process of forming an electrode by producing centrifugal deposition of matter, hardening the deposited matter and combining a depolorizer with it by centrifugal deposition.

2. The process of forming an electrode by producing centrifugal deposition of matter, hardening the deposited matter, combining a depolarizer with the hardened electrode by centrifugal deposition, and moulding an end of the depolarizer by means of a ring within the electrode.

In witness whereof I have hereunto set my hand.

JAMES STANLEY CROSSLEY.