



PATENT SPECIFICATION

NO DRAWINGS

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COMPLETE SPECIFICATION

Improved method of making Electrode Blanks

5 We, UNION CARBIDE CORPORATION, of
270 Park Avenue, New York, State of New
York, United States of America, a Corpora-
tion organised under the laws of the State
of New York, United States of America,
(Assignee of RAYMOND LYLE SCHENK, JR.),
do hereby declare the invention, for which
we pray that a patent may be granted to
us, and the method by which it is to be
10 performed, to be particularly described in
and by the following statement:—

15 This invention relates to a method of
making electrode blanks such as are used in
the manufacture of electrodes for nickel-
cadmium cells.

20 The conventional method of manufactur-
ing flat electrochemically active blanks for
use as electrodes comprises depositing on an
electrically conductive support web, generally
on both sides of a flat nickel screen, a layer
of fine nickel powder and heating the result-
ing blank in a reducing atmosphere
until the nickel particles are caused
to sinter and to adhere to one another and to
25 the nickel screen. The screen acts to add
strength to the finished electrodes and to
reduce contraction during sintering. The
electrode blank is then impregnated with an
electrochemically active material such as, for
30 example, a salt of cadmium or nickel, pre-
ferably the nitrate thereof and then convert-
ing such salt to the oxide or hydroxide. If
desired, the electrochemically active electrode
material may be deposited directly on the
35 electrically conductive support web and then
heated in a reducing atmosphere to cause
the particles to sinter and to adhere to one
another and to the support web.

40 However, it has been found that the shap-
ing of the finished electrode into a cylinder
for use in a cell is very difficult and the
process of the present invention provides
electrodes which can easily be shaped into
cylinders without difficulty.

45 The process of the present invention is
based upon the discovery that the sintered

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electrode blanks may be bent into a cylin-
drical shape having a relatively small radius
without any of the sintered powder breaking
away from the supporting web if, prior to
being shaped, the electrode blanks are first
50 compressed and slightly elongated by being
subjected to a rolling pressure. For example,
screen supported sintered electrode blanks,
which are initially impregnated with an oxide-
forming salt of cadmium or nickel, such as
55 the nitrate or hydroxide thereof, or the oxide
itself may be used, are passed between rollers
which thin and elongate the electrode blanks
slightly. The brittle, porous sintered nickel
60 powder is cracked across the direction of
rolling into uniformly sized small segments
by the rollers and these segments are hinged
together by the screen. The thus rolled
electrode blank may then be bent or shaped
65 without the coherent materials being broken
off. In the practice of the invention, it is
immaterial whether the rolling operation pre-
cedes or follows the sintering step to con-
vert the salt to the appropriate oxide. 70

75 The method of the present invention pro-
vides cylindrical electrodes of relatively small
diameter; for example, an electrode blank
initially 0.050 inch thick may be rolled to
a .048 inch thickness between three inch
diameter rollers and then bent into a 0.500
inch diameter cylinder for use in size AA
cells. Electrode blanks having a thickness
of 0.025 to 0.15 inch may be rolled.

80 In order to obtain the maximum degree
of bendability after rolling, the electrode
blank should be made with a thicker layer of
porous sintered nickel on one side of the
support web than on the other. After roll-
ing, the blank is bent so that the thicker
85 layer of porous sintered nickel is located
on the outer surface of the cylinder. The
web may be an expanded metal mesh or per-
forated metal sheet as well as a metal wire
screen. 90

It has also been found that when wire screen
is used as a support, rolling need not be

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limited to any particular direction of orientation with respect to the direction of the wire comprising the screen. Equally good results are obtained whether the electrode blank be rolled in a direction parallel to the mesh of the screen or in a direction diagonal to the mesh. If the electrode blank is rolled diagonally, the uniformly spaced cracks which appear as parallel cracks in the surface when the electrode blank is bent continue to be oriented in a direction at ninety degrees to the direction of rolling.

The rollers used for the compressing, elongating and cracking of the brittle electrode blank may be either smooth or ribbed. Ribbed rollers will compress the material somewhat more and will give more exactly spaced cracks.

WHAT WE CLAIM IS:—

1. A process for making electrode blanks which can be subsequently shaped to form electrodes, which comprises depositing comminuted electrochemically active electrode material onto a metallic conductive web, sintering such material to form a coherent layer and applying rolling pressure to the resulting blank to compress and elongate the latter and to effect substantially uniform cracking of the layer without causing it to separate from the supporting web.

2. A modification of the process as claimed in claim 1, in which rolling pressure is applied prior to sintering rather than subsequent thereto.

3. A process as claimed in claim 1 or 2, in which the metallic web is a metallic

screen, mesh or perforated sheet.

4. A process as claimed in claim 1, 2 or 3, in which the metallic web is made of nickel.

5. A process as claimed in any one of the preceding claims, in which the electrode blank prior to rolling has a thickness between 0.025 and 0.15 inch.

6. A process as claimed in any one of the preceding claims, in which the electrochemically active electrode material is deposited in a thicker layer on one side of the web than on the other, and after sintering and rolling the resulting blank is bent into a cylinder so that the thicker layer is on the outside thereof.

7. A process as claimed in any one of the preceding claims, in which the electrochemically active electrode material is an oxide or oxide forming salt of cadmium or nickel.

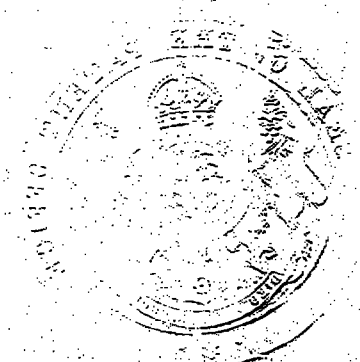
8. A process as claimed in claim 7, in which the hydroxide or nitrate of cadmium or nickel is employed.

9. A process as claimed in any one of the preceding claims, in which the rolling pressure is applied by a ribbed or smooth surfaced roll or rolls.

10. A process for making electrode blanks substantially as hereinbefore described.

11. Electrode blanks whenever made by the process hereinbefore described and claimed.

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limited to any particular direction of orientation with respect to the direction of the wire comprising the screen. Equally good results are obtained whether the electrode blank be rolled in a direction parallel to the mesh of the screen or in a direction diagonal to the mesh. If the electrode blank is rolled diagonally, the uniformly spaced cracks which appear as parallel cracks in the surface when the electrode blank is bent continue to be oriented in a direction at ninety degrees to the direction of rolling.

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4. A process as claimed in claim 1, 2 or 3, in which the metallic web is made of nickel.

5. A process as claimed in any one of the preceding claims, in which the electrode blank prior to rolling has a thickness between 0.025 and 0.15 inch.

6. A process as claimed in any one of the preceding claims, in which the electrochemically active electrode material is deposited in a thicker layer on one side of the web than on the other, and after sintering and rolling the resulting blank is bent into a cylinder so that the thicker layer is on the outside thereof.

7. A process as claimed in any one of the preceding claims, in which the electrochemically active electrode material is an oxide or oxide forming salt of cadmium or nickel.

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