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United States Patent [19]

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Schmutz et al.

[45] **Date of Patent:** Nov. 28, 1995

[54] **METHOD OF MAKING A LAMINATED LITHIUM-ION RECHARGEABLE BATTERY CELL**

[56] **References Cited**

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U.S. PATENT DOCUMENTS

4,714,665 12/1987 Siegel et al. 429/192
5,219,680 6/1993 Fauteux 429/192

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[21] Appl. No.: **428,970**

[57] **ABSTRACT**

[22] Filed: **Apr. 26, 1995**

Li-ion rechargeable battery cell electrode and electrolyte/separator elements formulated as layers of plasticized polymeric matrix compositions are laminated with electrically conductive collector elements to form a unitary battery cell structure. Adhesion between the electrode and collector elements is enhanced by pretreatment of the collector elements in which a 0.25% to 3.0% solution of a polymeric material compatible with said matrix polymer is applied to a collector foil or grid and dried to form a coated film, and the resulting coated collector element is heated within the range of about 250° to 450° C. for about 5 to 60 seconds.

Related U.S. Application Data

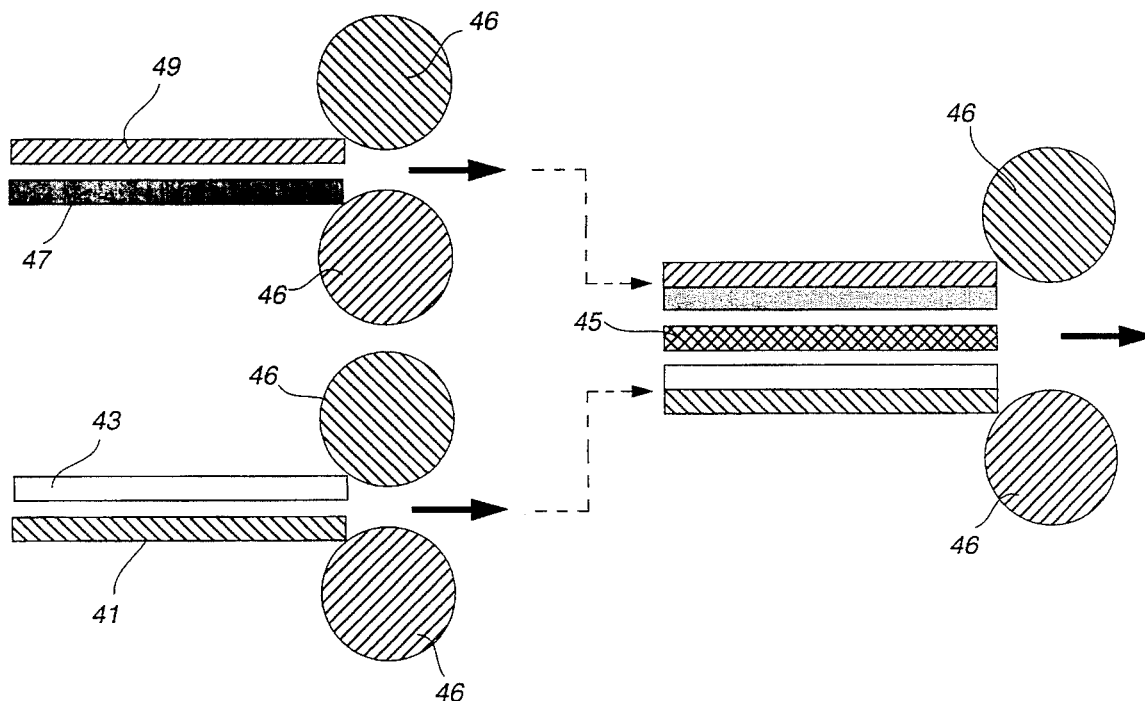
[63] Continuation-in-part of Ser. No. 160,018, Nov. 30, 1993, Pat. No. 5,460,904, which is a continuation-in-part of Ser. No. 110,262, Aug. 23, 1993, Pat. No. 5,418,091, which is a continuation-in-part of Ser. No. 26,904, Mar. 5, 1993, Pat. No. 5,296,318.

[51] **Int. Cl.⁶** **H01M 6/00**; H01M 6/18

[52] **U.S. Cl.** **29/623.5**; 29/623.1; 429/192

[58] **Field of Search** 29/623.5, 623.1;
429/192

8 Claims, 4 Drawing Sheets



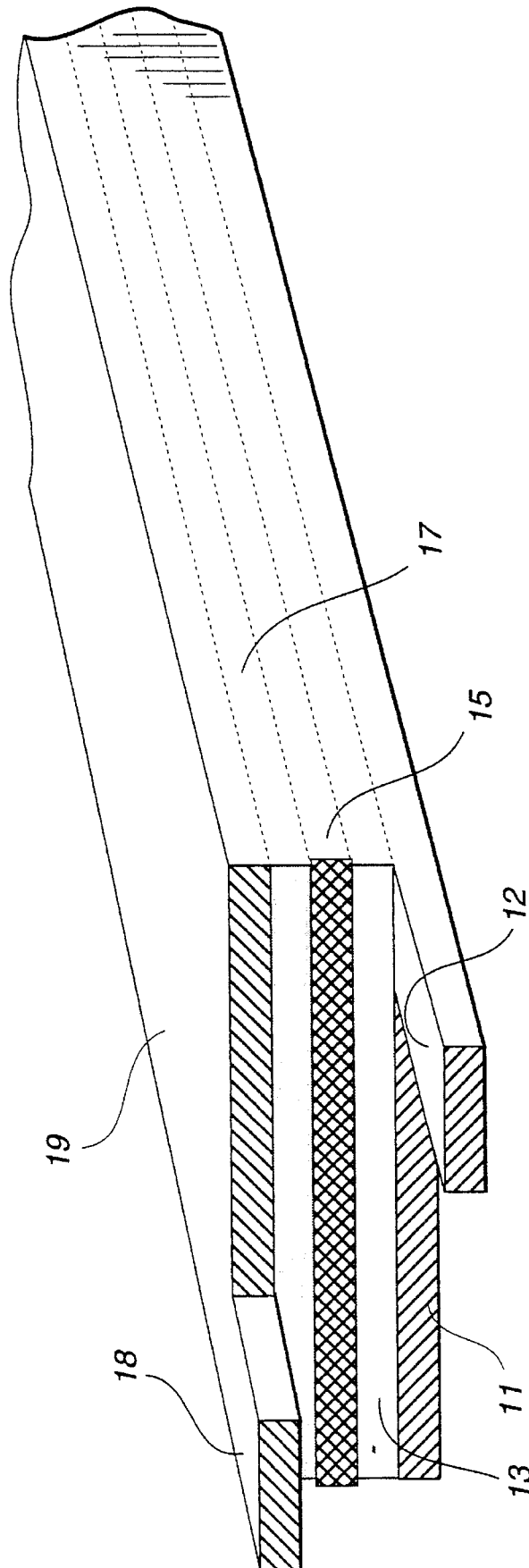
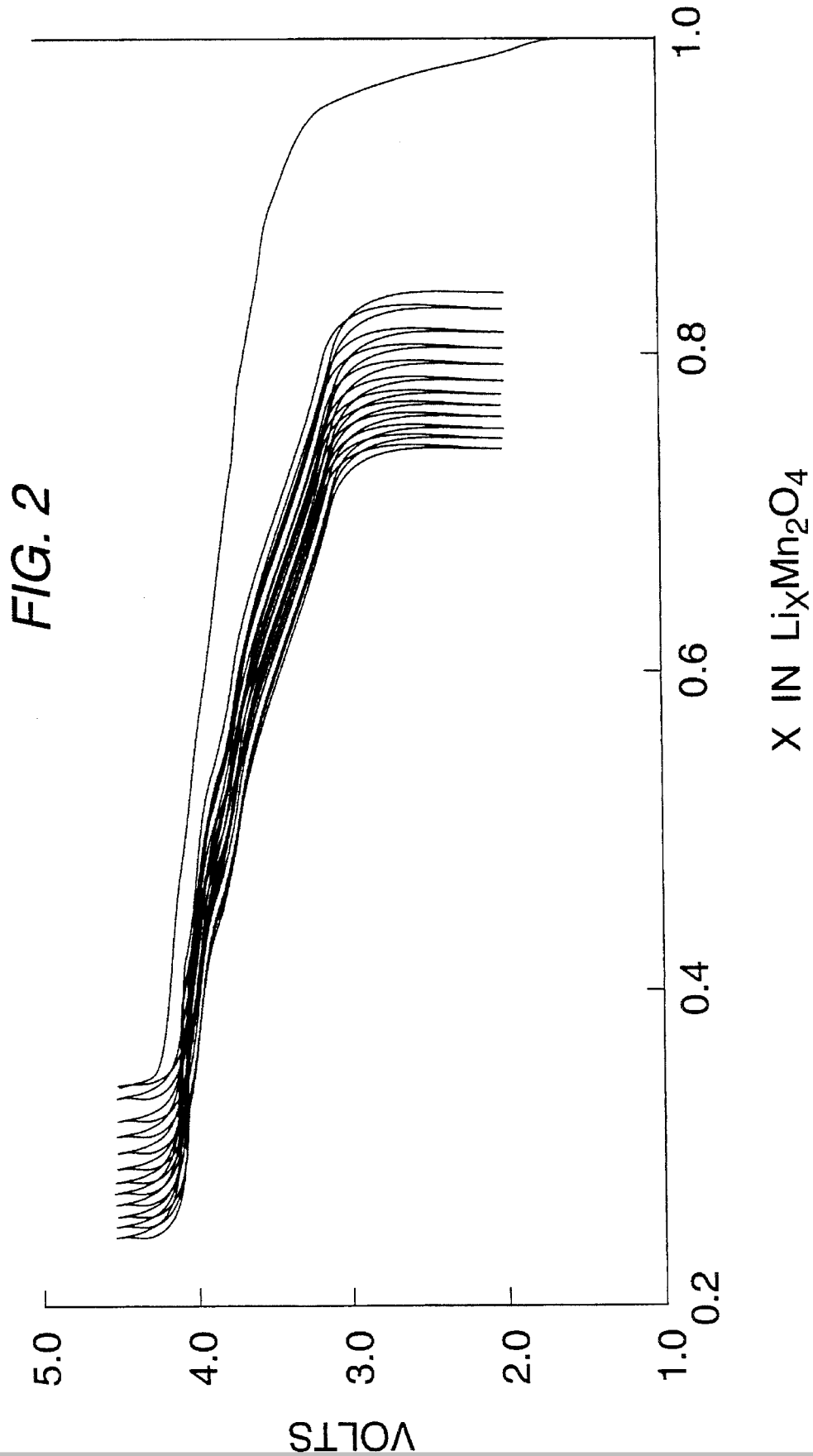


FIG. 1



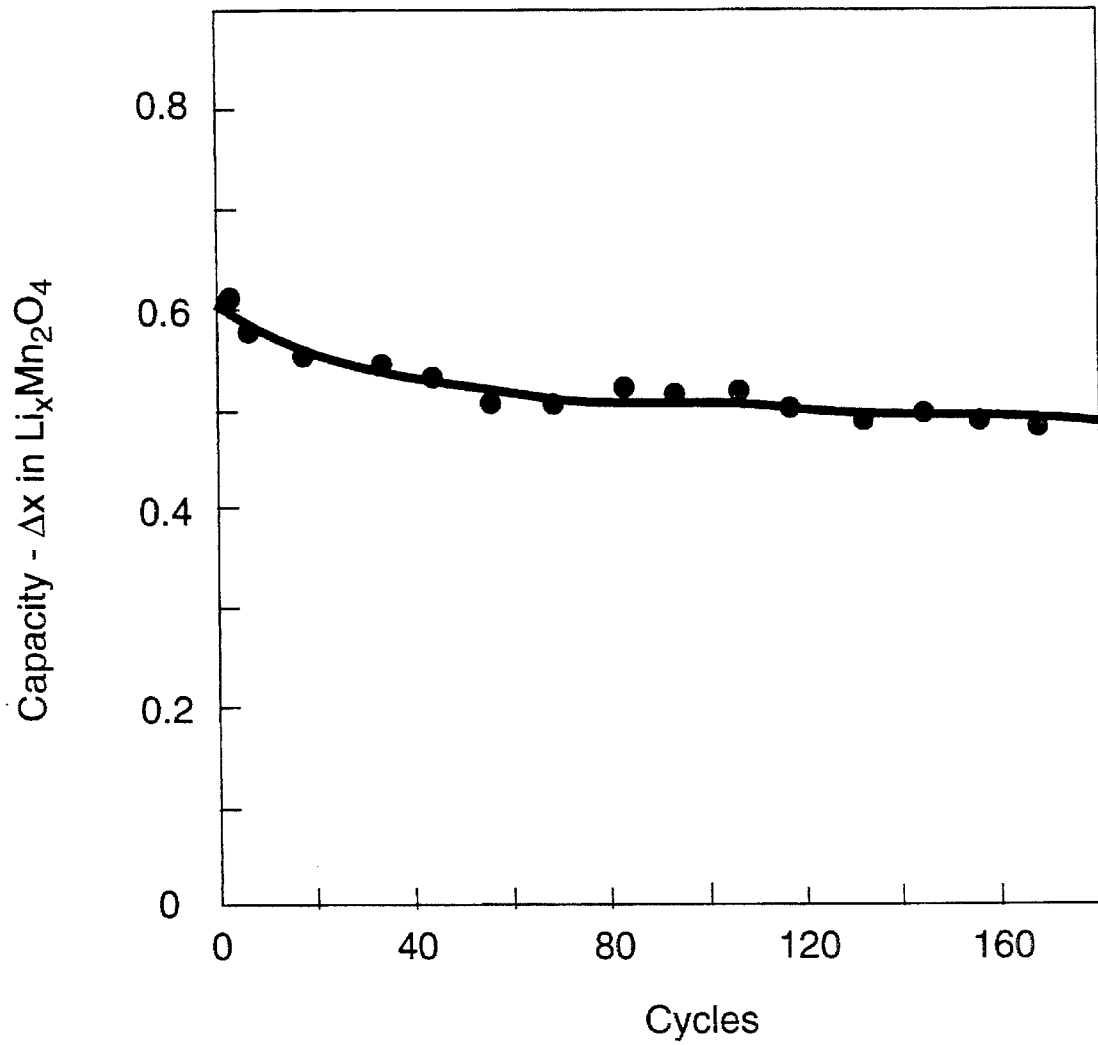


FIG. 3

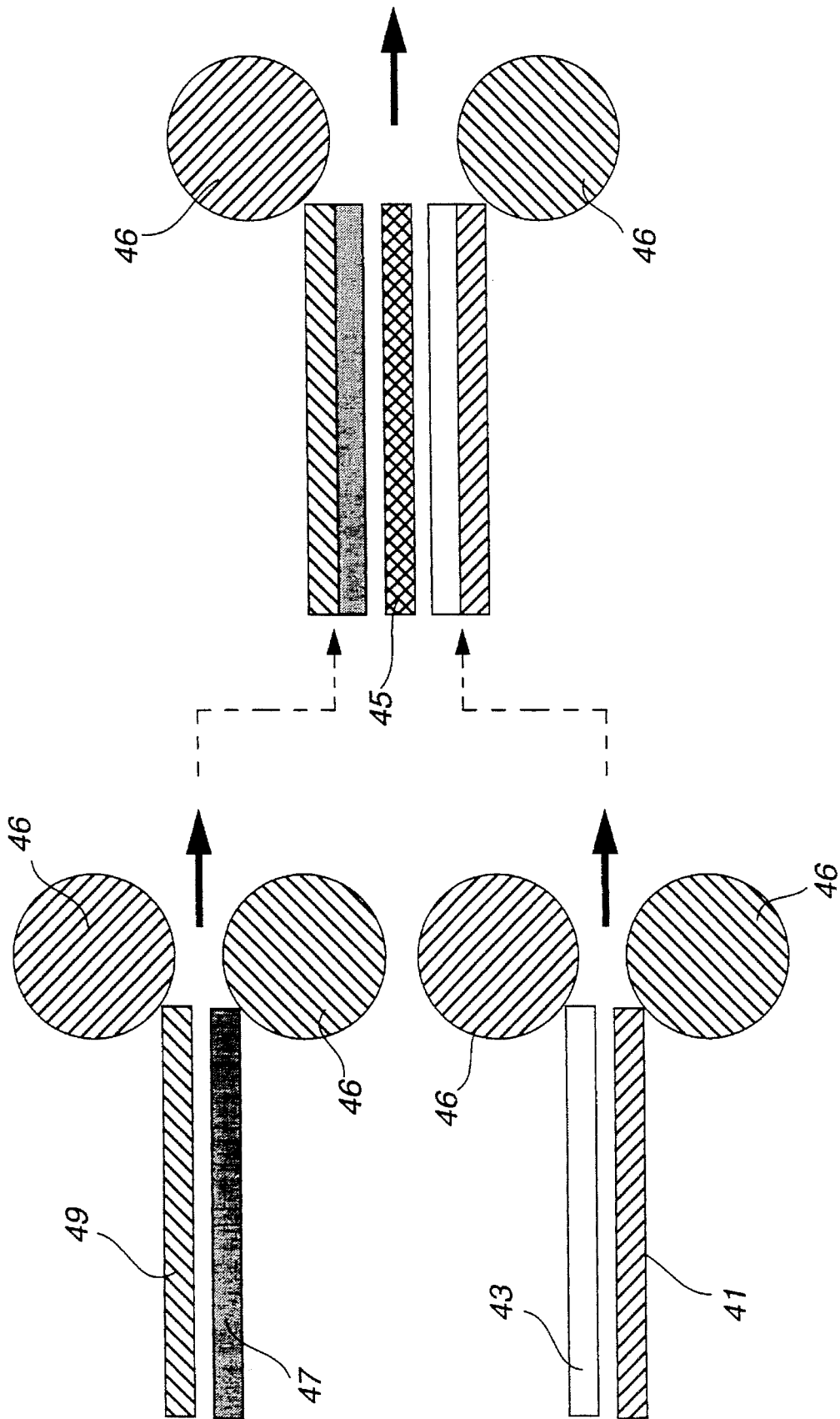


FIG. 4

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