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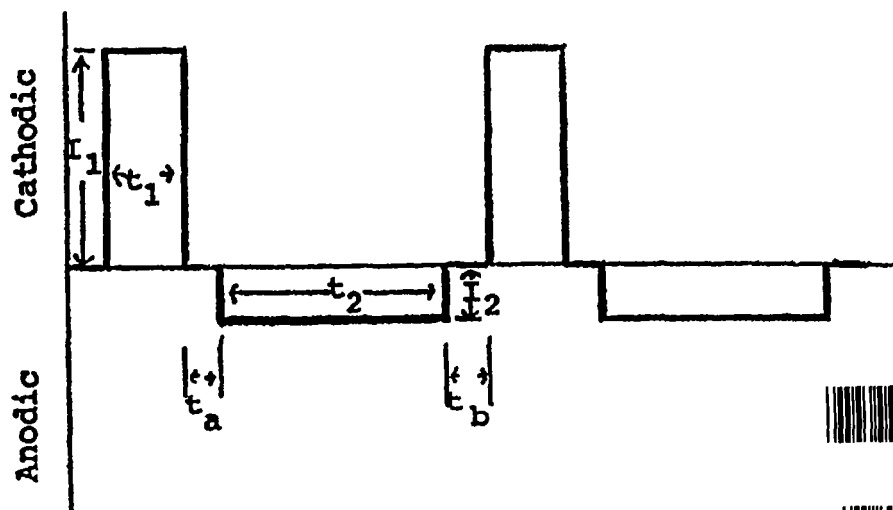
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(54) Title: ELECTRODEPOSITION OF METALS IN SMALL RECESSES USING MODULATED ELECTRIC FIELDS



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(57) Abstract

A layer of a metal is electroplated onto an electrically conducting substrate having a generally smooth surface with a small recess therein, having a transverse dimension not greater than about 350 micrometers, typically from about 5 micrometers to about 350 micrometers, by immersing the substrate and a counterelectrode in an electroplating bath of the metal to be electroplated and passing a modulated reversing electric current between the electrodes. The current contains pulses that are cathodic with respect to said substrate and pulses that are anodic with respect to said substrate. The cathodic pulses have a duty cycle less than about 50 % and said anodic pulses have a duty cycle greater than about 50 %, the charge transfer ratio of the cathodic pulses to the anodic pulses is greater than one, and the frequency of said pulses ranges from about 10 Hertz to about 12000 Hertz.