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(54) **METHODS AND APPARATUS FOR RAPIDLY PROTOTYPING THREE-DIMENSIONAL OBJECTS FROM A PLURALITY OF LAYERS**

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(57) **ABSTRACT**

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(52) **U.S. Cl.** ..... **700/118; 700/98; 264/401**

(58) **Field of Search** ..... 700/120, 119,  
700/118, 98, 163, 182; 264/401; 156/89;  
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Methods and apparatus are provided for rapidly prototyping a three-dimensional object from a plurality of sequential layers wherein each layer is cut after being fused with a preceding layer. A first sequential layer having a peripheral edge and an exposed face is cut from a first sheet of material using a machine tool path generated from a CAD model of the object. A solvent is then applied to a face of a second sheet of material. The second sheet of material is placed in contacting face-to-face relation with the first sequential layer such that the solvent fuses the face of the second sheet of material with the exposed face of the first sequential layer. A second sequential layer having a peripheral edge and an exposed face is cut from the second sheet of material along a respective machine tool path generated for the second sequential layer. The above procedure is repeated until all remaining layers of the prototype part are produced.

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**50 Claims, 12 Drawing Sheets**

