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**United States Patent** [19]  
**Howland et al.**

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[54] **SPINAL FIXATION SYSTEM**  
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[ \* ] Notice: This patent issued on a continued prosecution application filed under 37 CFR 1.53(d), and is subject to the twenty year patent term provisions of 35 U.S.C. 154(a)(2).

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**Related U.S. Application Data**

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[63] Continuation-in-part of application No. 08/340,640, Nov. 16, 1994, abandoned.  
[51] **Int. Cl.**<sup>6</sup> ..... **A61B 17/70**  
[52] **U.S. Cl.** ..... **606/61; 606/72**  
[58] **Field of Search** ..... 606/61, 60, 72,  
606/73, 53; 623/17

[57] **ABSTRACT**

A spinal fixation system utilizing grapple hooks comprising a lower hook attached to the lamina on the caudal-side of a vertebra and an upper hook attached to the lamina on the cranial-side of a vertebra. The hooks clamp the vertebra lamina in the center. Thus, the hooks clamp the lamina at the spinous process which is the strongest part of the lamina. Bolts are provided for attaching the lower hook to the upper hook to thereby attach the lower and upper hooks to the vertebra and clamps for attaching the lower and upper hooks to spine rods. A spinal fixation kit is provided with a plurality of uniquely configured fixation systems to assure satisfactory fit to any vertebra of any patient, and specially designed tools are preferably provided to aide in a method of implanting the systems thereby reducing the time required for implantation.

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**36 Claims, 18 Drawing Sheets**

