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[54] METHOD OF SURFACE HARDENING ORTHOPEDIC IMPLANT DEVICES

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[52] **U.S. Cl.** **623/66;** 427/250

[58] **Field of Search** 623/16, 18, 11, 66, 623/20, 22, 23; 427/2, 250

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[57] **ABSTRACT**

A method of surface hardening titanium orthopedic implant devices, and a titanium orthopedic implant device prepared by the disclosed method. An orthopedic implant device made of pure titanium or a titanium alloy, such as Ti-6Al-4V (ELI) is exposed to molecular nitrogen gas at a process temperature and for a process time duration sufficient to enhance surface hardness and wear resistance properties, without the formation of a measurable TiN layer that tends to increase surface roughness and diminish wear resistance properties. The process temperature is in the range of 750° F. to 1300° F., preferably about 1100° F. and the process time duration at the preferred process temperature is approximately 8 hours. The hardened surface of the titanium implant occurs primarily due to solid solution hardening of the titanium with nitrogen by dissolution.

18 Claims, 2 Drawing Sheets