



(19) **United States**

(12) **Patent Application Publication**

(10) **Pub. No.: US 2005/0070834 A1**

**Herr et al.**

(43) **Pub. Date: Mar. 31, 2005**

(54) **ACTIVE ANKLE FOOT ORTHOSIS**

(52) **U.S. Cl. .... 602/28**

(75) **Inventors: Hugh Herr, Somerville, MA (US);  
Joaquin Blaya, Santiago (CL); Gill A.  
Pratt, Lexington, MA (US)**

(57) **ABSTRACT**

Correspondence Address:  
**HAMILTON, BROOK, SMITH & REYNOLDS,  
P.C.  
530 VIRGINIA ROAD  
P.O. BOX 9133  
CONCORD, MA 01742-9133 (US)**

An Active Ankle Foot Orthosis (AAFO) is provided where the impedance of an orthotic joint is modulated throughout the walking cycle to treat ankle foot gait pathology, such as drop foot gait. During controlled plantar flexion, a biomimetic torsional spring control is applied where orthotic joint stiffness is actively adjusted to minimize forefoot collisions with the ground. Throughout late stance, joint impedance is minimized so as not to impede powered plantar flexion movements, and during the swing phase, a torsional spring-damper (PD) control lifts the foot to provide toe clearance. To assess the clinical effects of variable-impedance control, kinetic and kinematic gait data were collected on two drop foot participants wearing the AAFO. It has been found that actively adjusting joint impedance reduces the occurrence of slap foot, allows greater powered plantar flexion, and provides for less kinematic difference during swing when compared to normals.

(73) **Assignee: Massachusetts Institute of Technology,  
Cambridge, MA (US)**

(21) **Appl. No.: 10/671,329**

(22) **Filed: Sep. 25, 2003**

**Publication Classification**

(51) **Int. Cl.<sup>7</sup> ..... A61F 5/00**

