



US009408437B2

(12) **United States Patent**  
**Goodman et al.**

(10) **Patent No.:** **US 9,408,437 B2**  
(45) **Date of Patent:** **Aug. 9, 2016**

(54) **REEL BASED LACING SYSTEM**

USPC ..... 24/68 SK, 70 SK, 69, 71 SK, 909, 68 R,  
24/712

(71) Applicant: **Boa Technology, Inc.**, Denver, CO (US)

See application file for complete search history.

(72) Inventors: **James Paul Goodman**, Valencia, CA (US); **Eric Craig Irwin**, Lakewood, CO (US); **Mark S. Soderberg**, Conifer, CO (US); **Sean Cavanagh**, Golden, CO (US)

(56) **References Cited**

**U.S. PATENT DOCUMENTS**

59,332 A	10/1866	White et al.
80,834 A	8/1868	Prussia
117,530 A	8/1871	Foote
228,946 A	6/1880	Schulz
230,759 A	8/1880	Drummond
379,113 A	3/1888	Hibberd

(Continued)

(73) Assignee: **Boa Technology, Inc.**, Denver, CO (US)

(\* ) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

**FOREIGN PATENT DOCUMENTS**

CA	2114387	1/1994
CA	2112789	8/1994

(Continued)

(21) Appl. No.: **13/973,917**

(22) Filed: **Aug. 22, 2013**

(65) **Prior Publication Data**

US 2014/0117140 A1 May 1, 2014

**OTHER PUBLICATIONS**

U.S. Appl. No, 09/956,601, filed Sep. 18, 2001, Hammerslag.

(Continued)

**Related U.S. Application Data**

(63) Continuation of application No. 13/098,276, filed on Apr. 29, 2011, now Pat. No. 8,516,662.

(60) Provisional application No. 61/330,129, filed on Apr. 30, 2010.

*Primary Examiner* — Robert J Sandy

*Assistant Examiner* — David Upchurch

(74) *Attorney, Agent, or Firm* — Kilpatrick Townsend & Stockton LLP

(51) **Int. Cl.**

**A43C 11/16** (2006.01)

**B65H 75/44** (2006.01)

(52) **U.S. Cl.**

CPC ..... **A43C 11/165** (2013.01); **B65H 75/4431** (2013.01); **Y10T 24/2183** (2015.01); **Y10T 29/4984** (2015.01); **Y10T 74/2133** (2015.01)

(58) **Field of Classification Search**

CPC ..... A43C 11/165; B65H 75/4431; Y10T 24/2183; Y10T 29/4984; Y10T 74/2133

(57) **ABSTRACT**

A reel based lacing system is configured to allow the incremental tightening of a lace about a spool by rotation of a knob in the tightening direction. In some embodiments, the system can include a substantially inflexible pawl beam configured to resist rotation of the knob in the loosening direction and a pawl spring configured to bias the pawl against the housing and to allow the pawl to be displaced away from the housing when the knob is rotated in the tightening direction.

**19 Claims, 30 Drawing Sheets**

