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Rathbun et al.

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- (54) **BONE PLATE WITH CAPTIVE CLIPS**
- (75) Inventors: **David S Rathbun**, Gap, PA (US); **Sean S Suh**, Kirkland, WA (US)
- (73) Assignee: **DePuy Synthes Products, Inc.**, Raynham, MA (US)
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- (58) **Field of Classification Search**
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See application file for complete search history.

- (56) **References Cited**
- U.S. PATENT DOCUMENTS
- 408,080 A 7/1889 Carroll
- 424,836 A 4/1890 Thompson
- (Continued)
- FOREIGN PATENT DOCUMENTS
- CH 655646 5/1986
- CN 1360879 7/2002
- (Continued)
- OTHER PUBLICATIONS
- International Search Report, Completed Jan. 25, 2007 for PCT/US2006/038845 filed Oct. 3, 2006.
- (Continued)

Primary Examiner — David Isabella
Assistant Examiner — Christine Nelson
 (74) *Attorney, Agent, or Firm* — Baker & Hostetler LLP

(57) **ABSTRACT**
 A fixation system includes a plate comprising a top surface, a bottom surface, a central longitudinal axis, at least one fixation hole extending between the top and bottom surfaces and comprising an undercut therein, and at least one passage intersecting one of the undercuts. At least one resilient clip is disposed in at least a portion of the undercut, with the at least one clip having a pair of generally parallel sides and an end tab. At least one fastener is provided and comprises a head and a threaded shaft, with the head comprising a perimetral groove extending around at least a portion thereof and an instrument receiving portion. The at least one clip is configured and dimensioned to seat in the undercut with the end tab extending within the passage, and the at least one fastener is configured and dimensioned to be received in the at least one fixation hole and securable therein when the at least one clip abuts the perimetral groove of the head.

18 Claims, 70 Drawing Sheets

