



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

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(54) **FRICITION STIR WELD PLUGS AND METHODS OF USING THEREOF**

USPC 228/112.1, 113, 114, 2.1
See application file for complete search history.

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

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This patent is subject to a terminal disclaimer.

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"U.S. Appl. No. 14/043,596, Final Office Action mailed Jul. 30, 2014", 11 pgs.

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(57) **ABSTRACT**

(51) **Int. Cl.**
B23K 20/12 (2006.01)

In one aspect of the disclosure, an article for filling an opening in an object includes a plug having a body, a first flange, and a second flange. The plug has a trailing end. The first flange is in contact with the body and extends away from the body. The second flange is in contact with the first flange and extends away from the first flange and the body. The second flange is configured to deform toward the body upon installation of the plug into the opening. This deformation of the second flange rotationally and translationally secures the plug in the opening and consolidates the plug in the opening.

(52) **U.S. Cl.**
CPC **B23K 20/1215** (2013.01); **B23K 20/122** (2013.01); **B23K 20/129** (2013.01); **B23K 20/1225** (2013.01)

(58) **Field of Classification Search**
CPC .. B23K 20/122; B23K 20/1295; B23K 20/12; B23K 20/1225; B23K 20/1229

19 Claims, 14 Drawing Sheets

