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(54) Title: HIGH STRENGTH NICKEL ALLOY WELDS THROUGH PRECIPITATION HARDENING

(57) Abstract: Provided are precipitation hardened high strength nickel based alloy welds that yield improved properties and performance in joining high strength metals. The advantageous weldments include two or more segments of ferrous or non-ferrous components, and fusion welds, friction stir welds, electron beam welds, laser beam welds, or a combination thereof bonding adjacent segments of the components together, wherein the welds comprise a precipitation hardened nickel based alloy weld metal composition including greater than or equal to 1.4 wt% of combined aluminum and titanium based on the total weight of the nickel based alloy weld metal composition. Also provided are methods for forming the welds from the nickel based alloy weld compositions, wherein the precipitation hardening occurs in the as-welded condition. The nickel based welds do not require a separate heat treatment step after welding to produce advantageous strength properties.



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