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0822991.6 18 December 2008 (18.12.2008) GB(71) Applicant (for all designated States except US): **THE SECRETARY OF STATE FOR DEFENCE** [GB/GB]; DSTL, Porton Down, Salisbury, Wiltshire SP4 0JQ (GB).

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(54) Title: SUPER BAINITE STEELS AND METHODS OF MANUFACTURE THEREOF

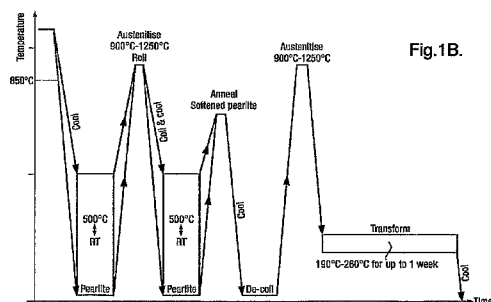


Fig. 1B.

(57) Abstract: Super Bainite Steel is described comprising between 90 % and 50 % bainite, the rest being austenite, in which excess carbon remains within the bainitic ferrite at a concentration beyond that consistent with equilibrium; there is also partial partitioning of carbon into the residual austenite. Such bainite steel has very fine bainite platelets (thickness 100nm or less). In this specification the expression "Super Bainite Steel" is used for such steel. In particular, the impact of varying the manganese content to achieve fast transformation times, and hence low manufacturing costs without the presence of expensive alloying materials is discussed. In one embodiment of the invention a Super Bainite Steel comprises in weight percent: carbon 0.6 to 1.1 %, silicon 1.5 to 2.0 %, manganese 0.5 to 1.8 %, nickel up to 3 %, chromium 1.0 to 1.5 %, molybdenum 0.2 to 0.5 %, vanadium 0.1 to 0.2 %, balance iron save for incidental impurities. In particular it was noted that excellent properties were obtained if the manganese content is about 1% by weight. Various processes for making the Super Bainite Steel are discussed, but a particularly useful process includes the step of cooling the steel from an austenite quickly enough to avoid transformation to pearlite and transforming the steel to bainite at a temperature in the range 190°C to 2500°C. The patent discusses the impact of changing the transition temperature on hardness, and conclude that the invention can provide a very hard steel (>630HV). It is also noted that suitable pearlite can be produced for cutting drilling and shaping, before final transformation to Super Bainite Steel.