

11

7. The method of claim 6 further comprising the step of forming a plurality of radial grooves in said layer of hard metal material.

8. The method of claim 4 further comprising the step of forming a plurality of radial grooves in the backface.

9. The method of claim 4 wherein constructing the base further comprises the steps of:

forming the base with an opening extending therethrough and an outer portion having a frustoconical shape around said opening; and

placing a plurality of inserts in the outer portion of the base.

10. The method of claim 9 further comprising the step of forming the inserts from material selected from the group consisting of sintered carbide, thermally stable diamonds, diamond particles, natural diamonds, or artificial diamonds.

11. A method of manufacturing a roller cone cutter for a rotary cone drill bit comprising the steps of:

forming said roller cone cutter from a cone body having a generally conical configuration including a base and a tip;

constructing said base with a backface formed in part with a nonheat-treatable hard metal component;

constructing said tip in part from conventional heat-treated steel; and

joining together said previously constructed tip and base.

12. The method of claim 11 wherein constructing said base further comprises the steps of:

depositing a desired coating thickness of powdered metal on a low alloy steel ring; and

heating said steel core and said powdered metal together to bond said powdered metal with said steel core.

13. The method of claim 11 further comprising the steps of:

12

shaping a portion of a steel core to receive a layer of hard metal material; and

forming said layer of hard metal material on said core within said shaped portion.

14. The method of claim 13 further comprising the step of forming a plurality of radial grooves in said layer of hard metal material.

15. The method of claim 11 further comprising the step of forming said backface from hard material selected from the group consisting of tungsten carbide, nitrides, borides, silicides of tungsten, niobium, vanadium, molybdenum, silicon, titanium, tantalum, hafnium, zirconium, chromium, boron, diamonds, diamond particles, carbon nitrides, or mixtures thereof.

16. The method of claim 4 further comprising joining said previously constructed tip and base by inertial welding.

17. The method of claim 11 wherein constructing the base further comprises the steps of:

placing a matrix ring in a mold having a cavity shaped to correspond with a desired frustoconical outer portion for the base;

filling the mold cavity with a hard metal powder; and heating the mold and the matrix ring to bond the hard metal powder with the matrix ring to form the outer portion of the base.

18. The method of claim 17 further comprising the step of filling the mold cavity with tungsten carbide particles.

19. The method of claim 11 wherein constructing the base further comprises the step of casting composite materials selected from a first group consisting of boron carbide, silicon nitride or silicon carbide and a second group consisting of high strength, low alloy steel or precipitation hardened stainless steel.

* * * * *