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(54) Title: MULTI-LAYER ENCAPSULATION OF DIAMOND GRIT FOR USE IN EARTH-BORING BITS

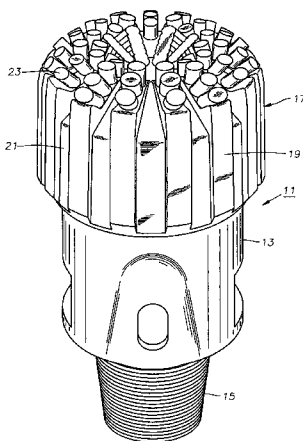


Fig. 1

(57) Abstract: A method of constructing an earth-boring, diamond-impregnated drill bit has a first step of coating diamond grit with tungsten to create tungsten-coated diamond particles. These coated particles are then encapsulated in a layer of carbide powder held by an organic green binder material. The encapsulated granules are then mixed along with a matrix material and placed in a mold. The matrix material includes a matrix binder and abrasive particles. The mixture is heated in the mold at atmospheric pressure to cause the matrix binder to melt and infiltrate the encapsulated granules and abrasive particles.

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AMENDED CLAIMS**received by the International Bureau on 18 August 2008 (18.08.08)**

1. A method of constructing an earth boring diamond-impregnated cutting structure, comprising:
 - (a) coating diamond particles with tungsten by a chemical vapor deposition process, creating coated particles;
 - (b) applying an encapsulation layer to each of the coated particles by mechanically attaching to the coated particles a powder made up of the material of the encapsulation layer and an organic green binder, creating encapsulated granules;
 - (c) placing the encapsulated granules and a matrix binder material in a mold shaped to define a cutting structure; then
 - (d) heating the encapsulated granules and the matrix binder material in the mold at atmospheric pressure for a time and temperature to cause the matrix binder material to melt and infiltrate around the encapsulated granules; then
 - (e) cooling the matrix binder material and the encapsulated granules, causing the matrix binder material to solidify and bond the encapsulated granules.
2. Cancelled
3. The method according to claim 1, wherein the green binder dissipates during step (d).
4. The method according to claim 1, wherein step (c) further comprises mixing hard, abrasive matrix particles in the mold along with the encapsulated granules and the matrix binder material.
5. The method according to claim 1, wherein the matrix binder material of step (c) comprises a copper alloy.

6. The method according to claim 1, wherein step (b) comprises adhering carbide powder around each of the coated particles.
7. The method according to claim 6, wherein the matrix binder material infiltrates into the encapsulation layers in step (d) and when solidified in step (e), bonds the carbide powder around the coated particles.
8. The method according to claim 1, wherein the matrix binder material infiltrates into the encapsulation layers in step (d) but is blocked from contact with the diamond particles by the tungsten coatings.
9. A method of constructing an earth boring diamond-impregnated drill bit, comprising:
 - (a) coating diamond particles with tungsten, creating coated particles;
 - (b) mechanically surrounding each of the coated particles with an encapsulation layer of a carbide powder held by an organic green binder material, creating encapsulated granules with a diameter in the range of 100 to 1000 microns;
 - (c) placing the encapsulated granules, a matrix binder material and abrasive particles in a mold shaped to define a crown for the drill bit; then
 - (d) heating the encapsulated granules, the matrix binder material, and the abrasive particles in the mold at atmospheric pressure for a time and temperature to cause the matrix binder material to dissipate the green binder material and to melt and infiltrate into the encapsulating layers of the encapsulated granules and around the abrasive particles; then

(e) cooling the matrix binder material, the encapsulated granules and the abrasive particles.

10. The method according to claim 9, wherein step (a) is performed by is performed by a chemical vapor deposition process.

11. The method according to claim 9, wherein the matrix binder material of step (c) comprises a copper alloy.

12. The method according to claim 9, wherein the carbide powder of the encapsulation layer comprises a material selected from the group consisting essentially of tungsten carbide, titanium carbide, and silicon carbide.

13. The method according to claim 9, wherein the abrasive particles of step (c) comprise tungsten carbide particles.

14. The method according to claim 9, wherein the encapsulation layers remain discrete after step (d).

15. An earth boring diamond-impregnated crown of a drill bit, comprising:

a matrix binder material; and

diamond particles embedded within the matrix binder material, each of the diamond particles having a tungsten coating and an encapsulation layer surrounding the tungsten coating.

16. The structure according to claim 15, wherein the matrix binder material comprises a copper alloy.

17. The structure according to claim 15, wherein the encapsulation layer is selected from a group consisting essentially of tungsten carbide, titanium carbide, and silicon carbide.

18. The structure according to claim 15, further comprising tungsten carbide particles embedded within the matrix binder material.