

STABILITY ENHANCED DRILL BIT AND CUTTING STRUCTURE
HAVING ZONES OF VARYING WEAR RESISTANCE

ABSTRACT

A fixed cutter drill bit (10) and cutting structure (14) are disclosed which include cutter elements (40) having cutting faces (44) with different abrasion resistances. The cutter elements (40) are spaced apart on the bit face so as to provide a bit cutting profile having abrasion resistance gradients. As wear occurs, the cutting structure assumes a cutting profile that creates grooves and ridges in the formation material to provide enhanced bit stabilization. Regions of differing abrasion resistances may also be provided on the individual cutting faces (44) to provide a cutting profile that enhances bit stabilization. Further, the cutting structure may include substrate members (42) that support the cutting faces (44) and that themselves are made of materials having differing degrees of abrasion resistance. Providing these regions of differing wear resistance along the bit face (44) tends to increase the bit's ability to resist vibration and provides an aggressive cutting structure, even after significant wear has occurred.

Fig. 1