

DRILL BIT HAVING IMPROVED CUTTING STRUCTURE WITH VARYING DIAMOND DENSITY

ABSTRACT

A fixed cutter drill bit (10) includes a cutting structure having radially-spaced sets of cutter elements (40). Each cutter in a set has a cutting profile that, in rotated profile, partially overlaps the cutting profiles of each of the other cutters (40) that are in the same set so as to create a region of maximum diamond density (60). The region of maximum diamond density (60) in a set is defined such that the centerlines (41) of the cutting profiles of the elements in the set pass through the region of maximum diamond density (60). The cutting profiles of the spaced set of cutters also may overlap to create border regions (70) of multiple diamond density. The diamond density of border regions (70) is less than or equal to the density in the region of maximum diamond density (60). Providing such regions of varying diamond density along the bit face (20) tends to increase the bit's ability to resist vibration.

Fig. 1.