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(72) Inventors: BISE, Douglas, E.; 207 Crestwood Drive, Chilhowie, VA 24319 (US). HAGA, Phillip, W.; 919 Wet Springs Road, Chilhowie, VA 24319 (US).

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(74) Agents: WELDON, Kevin, P. et al.; KENNAMETAL INC., P. O. BOX 231, 1600 TECHNOLOGY WAY, LATROBE, PA 15650-0231 (US).

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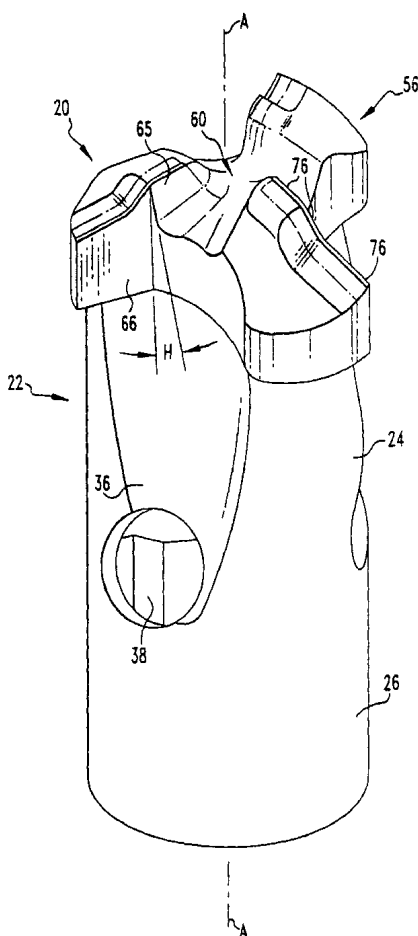
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(71) Applicant: KENNAMETAL INC. [US/US]; P. O. BOX 231, 1600 TECHNOLOGY WAY, LATROBE, PA 15650-0231 (US).

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(54) Title: MONOLITHIC ROOF BIT CUTTING BIT INSERT



(57) Abstract: A rotary drill bit for penetrating earth strata wherein the drill bit includes a drill bit body (22) that has an axial forward end (24). The drill bit body has a hard insert (56), which is preferably monolithic, that is affixed to the drill bit body at the axial forward end (24) thereof. The hard insert (56) presents at least three discrete leading cutting edges (76) for cutting the earth strata. Each cutting edge is stepped.



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**INTERNATIONAL SEARCH REPORT**

International application No.

PCT/US02/18345

**A. CLASSIFICATION OF SUBJECT MATTER**  
 IPC(7) : E21B 10/58  
 US CL : 175/427  
 According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**  
 Minimum documentation searched (classification system followed by classification symbols)  
 U.S. : 175/426,427,428,430,431

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)  
 Please See Continuation Sheet

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X --- Y	US 2,894,726 A (Weaver et al.) 14 July 1959 (14.07.59), see Figures 1-3 and 28, col. 5, lines 40-45, and col. 8, lines 35-45	1-3,6-8,14,15,19-28,30-36 ----- 4,5,9-13,16-18,29
Y	US 5,180,022 A (Brady) 19 January 1993 (19.01.93), see col. 5, lines 20-60.	10-12,16,17,29
Y	US 5,269,387 A (Nance) 14 December 1993 (14.12.93), see col. 2, lines 20-40.	13
Y	US 6,145,606 A (Haga) 14 November 2000 (14.11.00), see Figure 1.	18

Further documents are listed in the continuation of Box C.       See patent family annex.

* Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
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"O" document referring to an oral disclosure, use, exhibition or other means		
"P" document published prior to the international filing date but later than the priority date claimed		

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 Authorized officer: David B. Bener, Telephone No. (703) 308-1113

**Continuation of B. FIELDS SEARCHED Item 3:**

EAST

search terms: roof bit, insert, step, rake angle, degree, debris port, debris breaker, scalloped