Short Bit & Tool Co.
225 Gold St
Garland, Texas 75042
972-205-1011

My late father, Lot W. Short, Sr (1918-1983) graduated Oklahoma University with a BS Petroleum Engineering in 1939. He was a drilling engineer for Standard Oil of Indiana in the west Texas panhandle during WW2 and was hired in 1946 as the first employee of Drilling & Service, Inc (Dallas) Until it was bought in 1967 by Hycalog. He worked for Williams Diamond Bits (Greenville, TX) until 1974 when it too was bought by Hycalog.

Between my Dad and Ed B. Williams, Jr they invented many features in diamond drill bits and other fixed cutter/drag bits from 1943 until their deaths. Several of their bit patents included the basics of "control bite" which has been a benchmark for bit designers for 70+ years.

Any fixed cutter/drag bit works by having a relatively "sharp" surface which has a small area through which energy is transferred in order to penetrate the target formation. In some cases when the target formation is soft it can be easy for the small blade area to penetrate too far which could block the fluid flow of the bit. Both Williams and Short had surfaces that presented a non-drilling surface that would allow a controlled bite depth.

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Oct. 20, 1964 L. W. SHORT 3,153,458
BLADE-TYPE DRILL BIT
Filed Oct. 8, 1962 2 Sheets-Sheet 1

FIG. 1

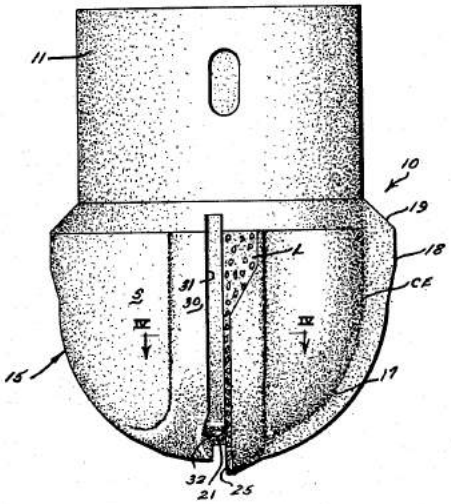


FIG. 4

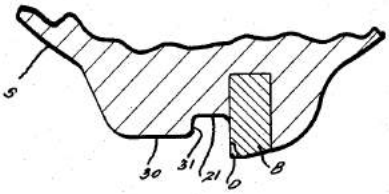
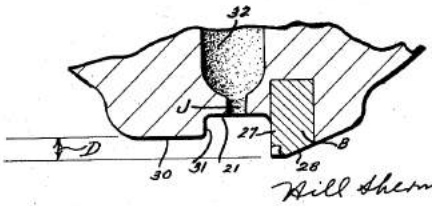


FIG. 5



INVENTOR.
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BY
Hill Sherman Meroni Gross & Simpson
ATTORNEYS

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I followed in my father's footsteps and worked for D&S, Williams, Hycalog, ACC, and back to Hycalog from 1964 to 1984. From 1980 to 1984 I was in charge of design, manufacture, and field applications of the then new PDC fixed cutter bits.

My early bit designs for Hycalog were the type that had blades that held the cutters that stood away from the body. Water courses were at the deepest point in the bit face and another surface presented a large surface area that controlled the bite depth. (12)

United States Patent [19]
Short, Jr.

[11] **4,453,605**
[45] **Jun. 12, 1984**

[54] **DRILL BIT AND METHOD OF METALLURGICAL AND MECHANICAL HOLDING OF CUTTERS IN A DRILL BIT**

[75] Inventor: **Lot W. Short, Jr.**, Dallas, Tex.

[73] Assignee: **NL Industries, Inc.**, Houston, Tex.

[21] Appl. No.: **259,182**

[22] Filed: **Apr. 30, 1981**

[51] **Int. Cl.**³ **E21B 10/52**
[52] **U.S. Cl.** ..... **175/410**; 76/108 A; 76/DIG. 11; 76/DIG. 12; 228/255; 29/447
[58] **Field of Search** ..... 175/409, 410, 411, 329, 175/374, 375, 393; 76/108 A, 101 E, DIG. 11, DIG. 12; 29/447; 228/255, 122, 135, 136

[56] **References Cited**

U.S. PATENT DOCUMENTS

3,294,186	12/1966	Buell	175/410
3,894,673	7/1975	Lowder et al.	76/DIG. 12
4,098,363	7/1978	Rohde et al.	175/329
4,156,329	5/1979	Daniels et al.	175/329
4,157,122	6/1979	Morris	29/447
4,186,628	2/1980	Bonnice	76/108 A
4,200,159	4/1980	Peschel et al.	175/329
4,225,322	9/1980	Kremeyer	175/329
4,276,788	7/1981	van Nederveen	76/108 A
4,327,473	5/1982	Somerville	29/447

FOREIGN PATENT DOCUMENTS

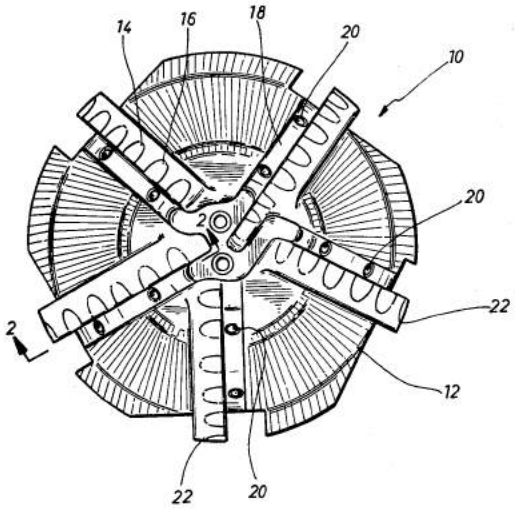
761808	10/1966	Canada	175/411
2056382	11/1970	Fed. Rep. of Germany	175/410

Primary Examiner—Stephen J. Novosad
Assistant Examiner—William P. Neuder
Attorney, Agent, or Firm—William E. Johnson, Jr.; Douglas H. May, Jr.; Carl O. McClenny

[57] **ABSTRACT**

Disclosed is a method and apparatus for mechanically and metallurgically holding a cutter in a drill bit pocket. The method includes using powder metallurgy techniques in the formation of a drill bit member having a plurality of pockets configured to inhibit displacement of cutters out of the pockets in a direction transverse to the drill bit working surface. The method further includes the steps of metallurgically bonding and mechanically engaging the cutter with the cutter pocket. The drill bit manufactured in accordance with the methods of the present invention include a carbide menstrum drill bit head having a working surface with a plurality of fluid courses and nozzles thereon in adjacent relationship with a plurality of cutter blade bands comprising a series of cutter pockets having cutters disposed therein in a fashion parallel with the working surface.

9 Claims, 6 Drawing Figures



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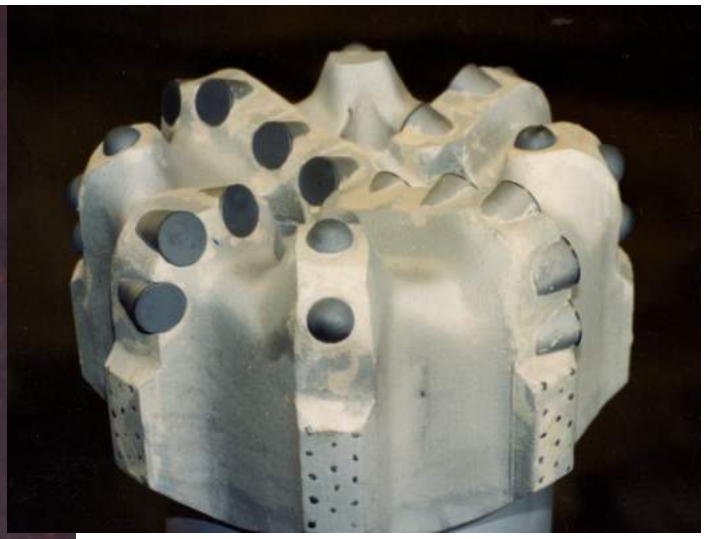
As designs advanced bits used more refined methods of controlling bite. The first ones I used was in 1983-1984 at Hycalog. This is one of the last bits I made at Hycalog in 1984 that had control bite dampeners that contained small diamonds.

I formed Short Bit & Tool Co. in 1984 and dedicated the first two years to new cutter Technology, but in 1986-87 I consulted for Maurer Engineering who pioneered horizontal drilling. I made bits at his Houston facility until spring, 1987 when I started making my own bits for the horizontal drilling industry. We made the first small PDC bits used in horizontal drilling which used several types of dampeners for control bite.



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By the early 1990's we were well known for our VZ-46 horizontal drill bit. We were the first in the industry to rent these bits and we did so to Baker INTEQ in West Texas. They used our 4 3/4" VZ-46 on a rental basis for almost a year in their turnkey horizontal drilling.