United States Patent [19]

Meyerhoff et al.

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[54] **NOVEL WEAR-RESISTANT LASER-ENGRAVED CERAMIC OR METALLIC CARBIDE SURFACES FOR FRICTION ROLLS FOR WORKING ELONGATE MEMBERS, METHOD FOR PRODUCING SAME AND METHOD FOR WORKING ELONGATE MEMBERS USING THE NOVEL FRICTION ROLL**

[75] Inventors: **Robert W. Meyerhoff**, Zionsville, Ind.; **Richard C. Hill**, Charlotte, N.C.

[73] Assignee: **Union Carbide Corporation**, Danbury, Conn.

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[52] **U.S. Cl.** **29/132**; 29/121.1; 219/121.69; 219/121.71; 219/121.72

[58] **Field of Search** ..... 29/132, 121; 19/143, 19/236, 258; 219/121, 121 LM, 121 L, 121 LN, 121 LK, 121 LL, 121 LH, 121 LS; 101/426; 428/556, 551; 156/639

[56] **References Cited**

U.S. PATENT DOCUMENTS

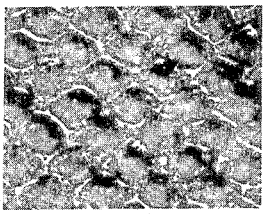
2,373,876	4/1945	Cutler	19/143
2,386,583	10/1945	Bacon	19/143
2,393,953	2/1946	Bacon	19/143
2,450,409	10/1948	Baymiller	19/143
2,450,410	10/1948	Baymiller	19/143
2,863,175	12/1958	Meyer	19/143
3,588,489	6/1971	Keller et al.	219/121
3,654,864	4/1972	Ovshinsky	101/426
3,902,234	9/1975	Fernandes	29/132
3,924,093	12/1975	Feldman et al.	219/121 LM
3,924,313	12/1975	Broderick	29/121
4,009,658	3/1977	Heurich	29/132
4,015,221	3/1977	Dalton	219/121 L
4,032,743	6/1977	Erbach et al.	219/121 LM
4,057,350	11/1977	Craig	356/199
4,087,672	5/1978	Yi	219/121 LM
4,128,752	12/1978	Gravel	219/121 L
4,131,782	12/1978	Einstein et al.	219/121 LM
4,173,685	11/1979	Weatherly	428/556
4,200,382	4/1980	Friedman	219/121 LM
4,248,369	2/1981	Clausen	219/121 LN
4,288,889	9/1981	Tikhonou et al.	19/236
4,322,600	3/1982	Crahay	219/121 LK
4,347,785	9/1982	Chase et al.	219/121 L
4,352,973	10/1982	Chase	219/121 LH
4,391,879	7/1983	Fabian et al.	428/551
4,417,369	11/1983	Hoover	19/258
4,489,461	12/1984	Hasegawa et al.	19/258
4,504,354	3/1985	George et al.	156/639
4,519,840	5/1985	Jackson et al.	428/546
4,524,785	6/1985	Seragnoli et al.	219/121 LM
4,547,936	10/1985	Bacchio	19/258

FOREIGN PATENT DOCUMENTS

1009507	5/1977	Canada .
3220534A1	6/1982	Fed. Rep. of Germany .
3139646A1	7/1982	Fed. Rep. of Germany .
0045088	3/1984	Japan .
0047086	3/1984	Japan .
1407079	9/1975	United Kingdom .
2049102A	12/1980	United Kingdom .
1585143	2/1981	United Kingdom .

Primary Examiner—Howard H. Goldberg
Assistant Examiner—Irene Cuda
Attorney, Agent, or Firm—James L. Sonntag

[57] **ABSTRACT**

The invention is to friction rolls for working elongate members, e.g., webs or strands, such as crimper rolls, draw rolls, yarn package drive rolls comprising a roll having a generally cylindrical external surface and a ceramic, e.g., alumina, mixtures of alumina and titania, chromia, zirconia, or metallic carbide, e.g., tungsten carbide, coating bonded to the external surface, the coating being laser-engraved, that is, having a plurality of laser-formed depressions having a pattern covering substantially the entire exterior working surface of the roll and providing a uniform, wear-resistant surface texture over substantially the entire working surface.

26 Claims, 3 Drawing Sheets