



US005824996A

United States Patent [19]
Kochman et al.

[11] **Patent Number:** **5,824,996**
[45] **Date of Patent:** **Oct. 20, 1998**

[54] **ELECTROCONDUCTIVE TEXTILE HEATING ELEMENT AND METHOD OF MANUFACTURE**
[75] Inventors: **Arkady Kochman**, Mt. Prospect; **Arthur Gurevich**, Wilmette, both of Ill.
[73] Assignee: **Thermosoft International Corp.**, Wilmette, Ill.

4,309,596	1/1982	Crowley .	
4,538,054	8/1985	de la Bretoniere .	
4,764,665	8/1988	Orban et al. .	
4,825,049	4/1989	Rickborn	219/545
4,983,814	1/1991	Ohgushi et al.	219/545
5,023,433	6/1991	Gordon	219/548
5,068,518	11/1991	Tasuda	219/549
5,298,722	3/1994	Tanaka	219/545

[21] Appl. No.: **855,595**
[22] Filed: **May 13, 1997**

Primary Examiner—Teresa J. Walberg
Assistant Examiner—Sam Paik
Attorney, Agent, or Firm—Longacre & White

[51] **Int. Cl.**⁶ **H05B 3/34; H01C 3/06**
[52] **U.S. Cl.** **219/529; 219/549; 338/211**
[58] **Field of Search** 219/211, 212, 219/527, 528, 529, 542, 543, 545, 548, 549; 338/210, 211, 212

[57] **ABSTRACT**

A soft and flexible thin heating element is made of strong, light and non-metallic yarns. The heating element comprises electrically conductive carbon/graphite containing fibers, woven or stranded into the strips, ropes, sleeves or strands of threads. The selected areas of the heating element core are modified to impart additional electrical properties. An optional positive temperature coefficient (PTC) material is incorporated into said selected areas. The electrode conductors are attached to said heating element core which is electrically connected in parallel or in series. The heating element core is shaped in a desired pattern. The whole assembly is sealed by at least one electrically insulating layer which envelops the strips, ropes, sleeves, or strands of threads.

[56] **References Cited**

U.S. PATENT DOCUMENTS

3,349,359	10/1967	Morey	219/545
3,385,959	5/1968	Ames et al.	219/549
3,657,516	4/1972	Fujihara	219/549
3,774,299	11/1973	Sato et al.	29/611
3,935,422	1/1976	Barnes et al.	219/543
4,149,066	4/1979	Niibe .	
4,250,397	2/1981	Gray et al.	219/528

56 Claims, 4 Drawing Sheets

