US005121339A

United States Patent [19]

Jenuwine et al.

[11] Patent Number: 5,121,339

[45] Date of Patent: Jun. 9, 1992

[54] LASER WELD FAULT DETECTION SYSTEM

[75] Inventors: David J. Jenuwine, Utica; Jacob N. George, Sterling Heights, both of Mich.

[73] Assignee: General Motors Corporation, Detroit, Mich.

[21] Appl. No.: 568,499

[22] Filed: Aug. 16, 1990

[51] Int. Cl.[5] G01N 29/14; B23K 26/00

[52] U.S. Cl. 364/507; 364/552; 219/130.01

[58] Field of Search 364/505, 506, 507, 551.01, 364/551.02, 550, 552, 575, 576, 726, 574, 474.08, 477; 73/587, 588, 603, 632; 219/130.01

[56] References Cited

U.S. PATENT DOCUMENTS

3,679,865	7/1972	Jesnitzer	219/130.01
3,965,726	6/1976	Vahaviolos	73/587
4,007,631	2/1977	Saifi et al.	73/587
4,144,766	3/1979	Wehrmeister	73/587
4,419,562	12/1983	Jon et al.	219/130.01
4,501,149	2/1985	Konno et al.	73/587
4,615,027	9/1986	Rajkai et al.	364/726
4,633,057	12/1986	Wilson et al.	219/121.63

FOREIGN PATENT DOCUMENTS

0014083	1/1986	Japan	219/124.34

Primary Examiner—Parshotam S. Lall
Assistant Examiner—M. J. Zanelli
Attorney, Agent, or Firm—Howard N. Conkey

[57] ABSTRACT

An on-line, non-destructive method and apparatus monitors a welding process and detects faulty welds by analyzing the average frequency of the airborne radiation emitted from a weld during the welding process. A sequence of measured average frequency values corresponding to sequential blocks of time during the weld are individually compared to a predetermined frequency threshold value. Overall weld integrity is discerned by comparing the number of average frequency values exceeding the threshold value to the number of average frequency values not exceeding the threshold value.

7 Claims, 2 Drawing Sheets