

United States Patent [19]

Little et al.

[11] Patent Number: **4,869,187**

[45] Date of Patent: **Sep. 26, 1989**

- [54] **SEWING MACHINE HAVING SEWING FORCES MEASUREMENT SYSTEM**
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- [21] Appl. No.: **212,912**
- [22] Filed: **Jun. 29, 1988**
- [51] Int. Cl.⁴ **D05B 81/00**
- [52] U.S. Cl. **112/262.1; 112/235; 112/270; 112/121.11; 73/862.54**
- [58] Field of Search **112/270, 235, 272, 121.11, 112/262.1, 453; 73/862.54, 862.55, 862.65**
- [56] **References Cited**

U.S. PATENT DOCUMENTS

3,055,326	9/1962	Greulich	112/235
3,554,025	1/1971	Andersson et al.	73/141
4,166,423	9/1979	Brienza et al.	112/254
4,343,249	8/1982	Takenoya et al.	112/453 X
4,363,281	12/1982	Reinke	112/121.11
4,478,092	10/1984	Oren, III	73/862.55
4,565,140	1/1986	Martell et al.	112/121.11

4,565,143	1/1986	Hanyu et al.	112/262.1
4,660,481	4/1987	Spickermann	112/235
4,798,152	1/1989	Simons et al.	112/262.1

FOREIGN PATENT DOCUMENTS

3540126	2/1987	Fed. Rep. of Germany	112/121.11
1064279	4/1986	Japan	112/235
2120883	6/1987	Japan	112/235

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[57] ABSTRACT

A sewing machine having a presser bar and a needle bar and each having a force transducer mounted thereon for simultaneously detecting changes in load applied to the presser bar and needle bar. The force transducers are connected to a circuit including a computer for monitoring the fabric feeding and stitch formation forces encountered by the presser bar and the needle bar during sewing and analyzing the simultaneous force signal data from the force transducers on the needle bar and the presser bar of the sewing machine.

20 Claims, 4 Drawing Sheets

