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[54] **SYNCHRONOUS DRIVE SYSTEM FOR AUTOMATED TEXTILE DRAFTING SYSTEM**

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[58] Field of Search ..... **318/34-112; 19/236-295, 19/157, 159 R, 106 R**

[56] **References Cited**

**U.S. PATENT DOCUMENTS**

4,768,262	9/1988	Gunter	19/258
5,010,624	4/1991	Stahlecker	19/261
5,133,512	7/1992	Mondini et al.	242/66
5,161,284	11/1992	Liefeld	19/260
5,248,925	9/1993	Jornot	318/628
5,339,495	8/1994	Haworth et al.	19/159 R
5,388,310	2/1995	Haworth	19/65 A
5,398,380	3/1995	Leifeld	19/98

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[57] **ABSTRACT**

An automated drafting system particularly suitable for drafting textile strands of sliver is provided. The automated drafting system includes a synchronous drive sliver drafting roller system utilizing toothed gears in the preferred embodiment operatively connecting a pair of drafting rollers with one of the rollers being directly driven by a motor to thereby cause identical rotation of both rollers. The automated drafting system also includes a system for securing and pressuring together upper and lower sliver drafting rollers wherein the lower roller of a pair of drafting rollers is preferably maintained in a fixed but rotational position while the upper roller of the pair is pressured towards the lower roller and controllably restricted as to both horizontal and vertical movement during the drafting process. A sliver autoleveling system using tongue and groove drafting rollers to sense sliver uniformity is also included in the automated drafting system utilizing linear variable differential transformers (LVDTs) to monitor vertical displacement of the upper roller of a roller pair relative to the lower roller. The automated drafting system further provides a feed-forward and feed-back autoleveling system for control of sliver drafting rollers utilizing an input sliver sensor and an output sliver sensor communicating with a computer to facilitate sliver uniformity. A draftless sliver coiler packaging system is still further provided by the automated drafting system and utilizes a sliver level sensor to controllably and automatically adjust the speed at which sliver is packaged subsequent to emergence from a variable speed sliver delivery system.

**5 Claims, 23 Drawing Sheets**

