United States Patent [19]

Salani et al.

[11] **Patent Number: 4,686,880**

[45] **Date of Patent: Aug. 18, 1987**

[54] **DIGITAL INTERFACE FOR ACOUSTIC AND ELECTRICALLY AMPLIFIED PIANOS**

[75] Inventors: **Steven J. Salani**, Milpitas; **Jeffrey C. Moffatt**, Cupertino, both of Calif.

[73] Assignee: **Forte Music, Inc.**, San Jose, Calif.

[21] Appl. No.: **601,474**

[22] Filed: **Apr. 18, 1984**

[51] **Int. Cl.**[4] **G10H 1/34**; G06F 3/02

[52] **U.S. Cl.** ..... **84/1.01**; 340/365 S; 340/365 R; 340/365 A

[58] **Field of Search** ..... 340/365 S, 365 R, 365 C, 340/712; 84/1.1, DIG. 7, 1.26, 1.27, 433, 434, 436

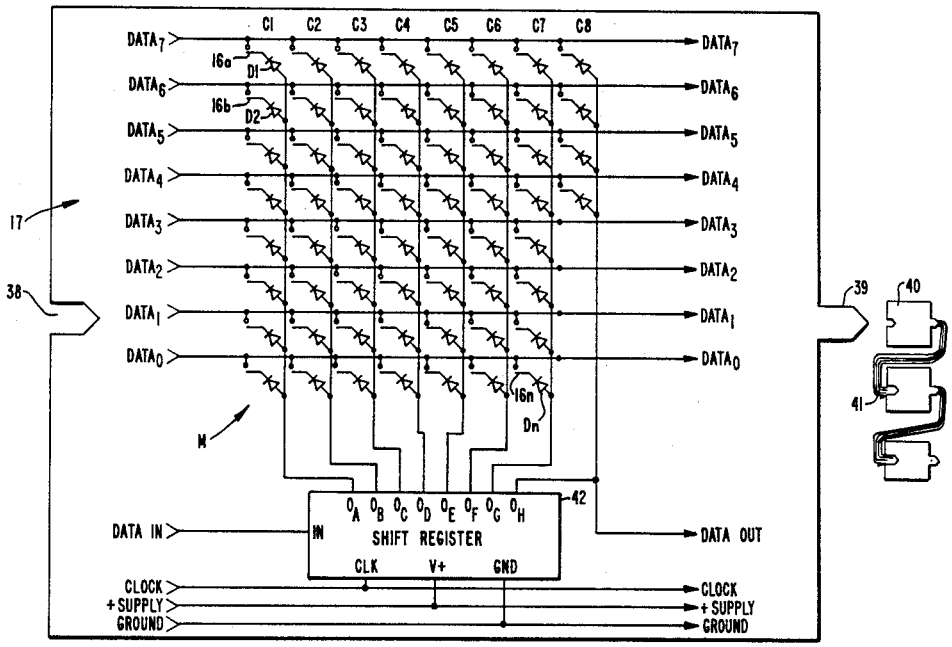
[56] **References Cited**

U.S. PATENT DOCUMENTS

3,604,299	9/1971	Englund	84/1.03
3,789,719	2/1974	Maillet	84/115
4,023,456	5/1977	Groeschel	84/115
4,067,253	1/1978	Wheelwright et al.	84/1.1
4,104,949	8/1978	Clark	84/462
4,138,916	2/1979	Kitagawa	340/365 S
4,186,638	2/1980	Iijima	340/365 S
4,307,648	12/1981	Stahnke	84/462
4,351,221	9/1982	Starnes et al.	84/1.28
4,414,538	11/1983	Schnizlein	340/365 S
4,469,000	9/1984	Fujiwara et al.	84/1.1
4,506,581	3/1985	Sunada	84/1.1
4,510,839	4/1985	Kumano	84/834
4,520,706	6/1985	Deforeit	84/DIG. 7
4,528,885	7/1985	Chihana	84/1.1

Primary Examiner—John W. Caldwell, Sr.
Assistant Examiner—Mahmoud Fatahi-Yar
Attorney, Agent, or Firm—Townsend and Townsend

[57] **ABSTRACT**

A digital keyboard interface for a keyboard operated musical instrument, such as a piano, includes at least one switch associated with each key on the keyboard and positioned therebeneath. Key actuation produces a corresponding associated switch actuation. The keyboard interface is readily installed within an acoustic or electronic piano and includes adjustments for height and side-to-side alignment to provide precise registration of keys and switches and to provide simplified installation of the interface within the piano. A switch matrix includes a plurality of rows that assign switch closure information to corresponding data byte bit positions in a digital data stream. A shift register sequentially, and on a one-at-a-time basis, actuates a series of matrix columns to read a set of swtiches associated with the column. Thus, each switch operated in an actuated column corresponds to a data byte bit position in the data stream which is further processed to generate a serial data stream for external devices. One embodiment of the invention provides switches of the type having two contact sets by which key velocity information may be transmitted to an external electronic musical instrument or memory device. The invention also provides an interface for collecting and transmitting piano pedal information.

1 Claim, 7 Drawing Figures