United States Patent [19]

Burke

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[54] **PHOTO-OPTICAL KEYBOARDS**

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[52] **U.S. Cl.** ..... **340/365 P**; 200/314; 200/317; 250/221; 400/491.3

[58] **Field of Search** ..... 340/365 R, 365 P, 365 E, 340/365 S, 365 VL, 365 C; 178/17 A, 17 C, 17 D, 17.5, 21; 179/90 K; 250/221, 227, 578, 229; 200/5 A, 310, 313, 314, 317; 400/479, 94, 482, 91, 491.3

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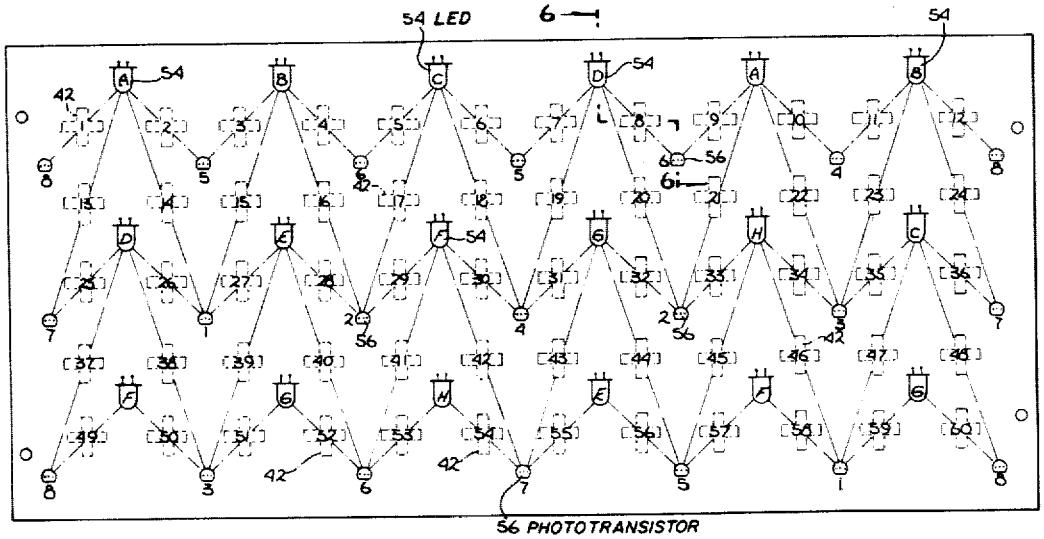
[57] **ABSTRACT**

Photo-optical keyboards for providing electrical signals responsive to the keying of the keyboard. The keyboard structure consists of an arrangement of individual keys disposed and identified in accordance with the particular application and adapted for longitudinal motion on depression thereof. Located below the plurality of keys is a matrix of light sources and photo detectors disposed in such a manner that depression of any single key will interrupt the light path between one of the light sources and one of the detectors to provide a change in the electrical state of the associated circuitry. The light sources and detectors are arranged so that in general a single light source illuminates a plurality of detectors, and each detector may be illuminated by any of a plurality of light sources, so that the number of light sources and sensors required for the complete keyboard is substantially less than the number of keys to be sensed. A microprocessor based system for scanning the light sources and detectors is disclosed. In general individual light channels in the keyboard structure are not required as a scanning technique avoids undesired optical cross-talk. By making a portion of each key substantially transparent, light from the light sources may be directed upward through the keys to illuminate the keyboard.

32 Claims, 10 Drawing Figures