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United States Patent [19]

Bowen

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[54] **LIGHT CONTROLLED TOUCH PAD FOR CURSOR AND SELECTION CONTROL ON A COMPUTER DISPLAY**

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Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 166,906, Dec. 15, 1993, Pat. No. 5,378,069, which is a continuation of Ser. No. 933,749, Aug. 24, 1992, abandoned.

[51] **Int. Cl.**[6] **B41J 5/00**; G09G 5/00

[52] **U.S. Cl.** **400/472**; 341/22; 345/157; 345/173

[58] **Field of Search** 400/472, 479; 341/21, 22, 23; 345/157, 173

[56] **References Cited**

U.S. PATENT DOCUMENTS

3,526,775	12/1968	Friedrich et al.	250/211
3,764,813	10/1973	Clement et al.	250/221
3,775,560	11/1973	Ebeling et al.	178/18
4,243,879	1/1981	Carroll et al.	250/221
4,267,443	5/1981	Carroll et al.	250/221
4,305,071	12/1981	Bell et al.	340/712
4,311,990	1/1982	Burke	340/365
4,346,376	8/1982	Mallos	340/7
4,384,201	5/1983	Carroll et al.	250/221
4,387,367	6/1983	Fisher	340/365
4,413,314	11/1983	Slater et al.	364/188
4,417,824	11/1983	Paterson et al.	400/477
4,467,193	8/1984	Carroll	250/216
4,484,179	11/1984	Kasday	340/365
4,567,480	1/1986	Blanchard	340/712
4,591,710	5/1986	Komadina et al.	250/221
4,645,920	2/1987	Carroll et al.	250/221
4,672,364	7/1987	Lucas	340/365
4,684,801	8/1987	Carroll et al.	250/221
4,695,827	9/1987	Beining et al.	340/365
4,700,176	10/1987	Adler	340/365
4,701,747	10/1987	Isherwood et al.	340/365
4,713,534	12/1987	Masters et al.	250/214
4,736,191	4/1988	Matzke et al.	345/157
4,761,637	8/1988	Lucas et al.	340/365
4,766,424	8/1988	Adler et al.	340/712
4,777,375	10/1988	Bozzuto, Jr.	250/551
4,796,007	1/1989	Heys, Jr.	341/31
4,799,044	1/1989	Masters et al.	341/5
4,800,264	1/1989	Vissiere	250/221
4,812,830	3/1989	Doering	340/712
4,812,833	3/1989	Shimauchi	340/712
4,818,859	4/1989	Hough	250/221
4,901,584	2/1990	Brunner et al.	73/862
4,943,806	7/1990	Masters et al.	341/31
4,988,983	1/1991	Wehrer	340/712
5,055,840	10/1991	Bartlett	341/31
5,105,186	4/1992	May	340/784
5,327,161	7/1994	Logan et al.	345/157

OTHER PUBLICATIONS

IBM TDB, Transparent Keyless Keyboard S7518 0086M Sep. 1977.

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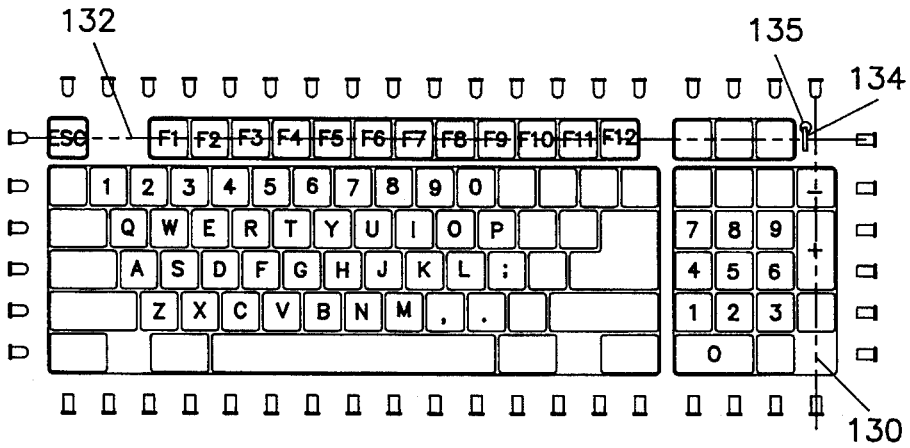
[57] **ABSTRACT**

A keyboard where no finger pressure is needed to input data, that uses rows of emitters opposed by rows of detectors to detect a finger position, that is environmentally sealed, and inherently intrinsic safe. The keyboard has a mouse function so an operators finger can be tracked to position a cursor on a host display, and input normal keyboard functions. The keyboard has a field changeable coded overlay with indicia thereon so a scan pattern, ambient reference level or other application specific variables can be changed without breaking the environmental seal or powering down the keyboard. Further, the different scan patterns can include scanning the finger position by multiple emitter detector pairs at angles other than ninety degrees to give a cross check of detection. These said scan patterns can be further optimized to scan angled sets of keys and to adjust to different ambient light conditions so errors can be detected by the emitter detector pair closest to detection of a finger. Further to have a scanning technique so less emitters can be used than detectors. The scanning pattern can also include detecting the speed of the finger and relating that speed to the accuracy of the cursor, and emitting a frequency to be decoded by the detector to eliminate cross talk and ambient light interference.

6 Claims, 11 Drawing Sheets