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United States Patent [19]
Redmayne

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[54] **CAPACITIVE TOUCH SENSOR**
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[22] **Filed:** **Jan. 20, 1995**
[51] **Int. Cl.⁶** **G08C 21/00**
[52] **U.S. Cl.** **178/19; 345/174; 341/33**
[58] **Field of Search** **178/18, 19, 20; 345/173, 174; 364/709.1, 709.11; 341/5, 33**

4,916,699 4/1990 Ohashi .
4,922,061 5/1990 Meadows et al. .
5,041,820 8/1991 Kazama .
5,083,118 1/1992 Kazama .
5,153,572 10/1992 Caldwell et al. .
5,231,381 7/1993 Duwaer .
5,237,879 8/1993 Speeter .
5,270,711 12/1993 Knapp .
5,305,017 4/1994 Gerpheide .
5,418,551 5/1995 Ise 178/20
5,488,204 1/1996 Mead et al. 178/18
5,491,706 2/1996 Tagawa et al. 178/19

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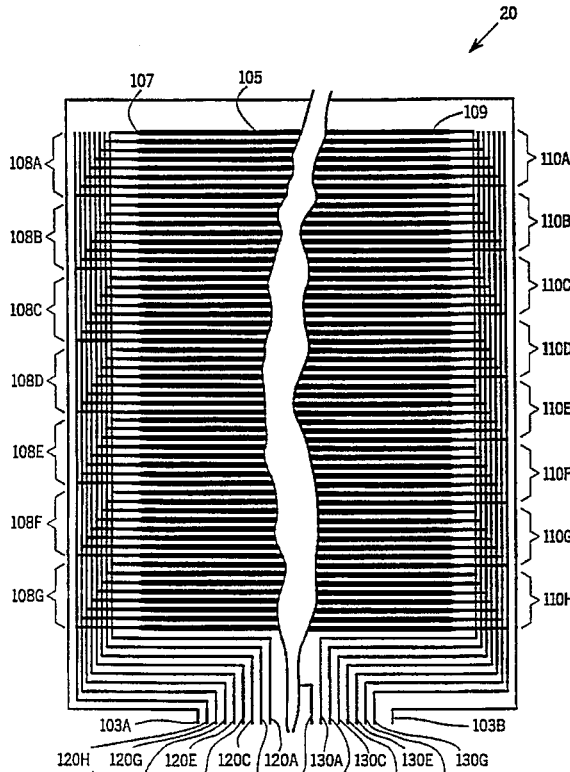
[56] **References Cited**
U.S. PATENT DOCUMENTS

3,482,241 12/1969 Johnson .
4,186,392 1/1980 Holz .
4,233,522 11/1980 Grummer et al. .
4,281,323 7/1981 Burnett et al. .
4,293,734 10/1981 Pepper, Jr. .
4,455,452 6/1984 Schuyler .
4,476,463 10/1984 Ng et al. .
4,550,221 10/1985 Mabusth .
4,707,845 11/1987 Krein et al. .
4,740,781 4/1988 Brown .
4,743,895 5/1988 Alexander .
4,806,709 2/1989 Evans .
4,831,566 5/1989 Mattews et al. 178/20
4,853,498 8/1989 Meadows et al. .

[57] **ABSTRACT**

The present invention relates to a capacitive touch sensor including a plurality of horizontal sensor bars arranged in a single direction. The touch sensor preferably receives differential sensor signals from the sensor array to reduce proximity effects and noise associated with conventional capacitive touch sensors. The touch sensor also utilizes an isolation circuit or floating interface to reduce the effects of external interference and increase the accuracy of touch sensing and localization. The bars are preferably comprised of indium tin oxide oriented in the machine direction of roll for superior linearity. The touch sensor may be utilized with display screens having thick dielectrics and also eliminates the need for a rear guard layer.

22 Claims, 13 Drawing Sheets



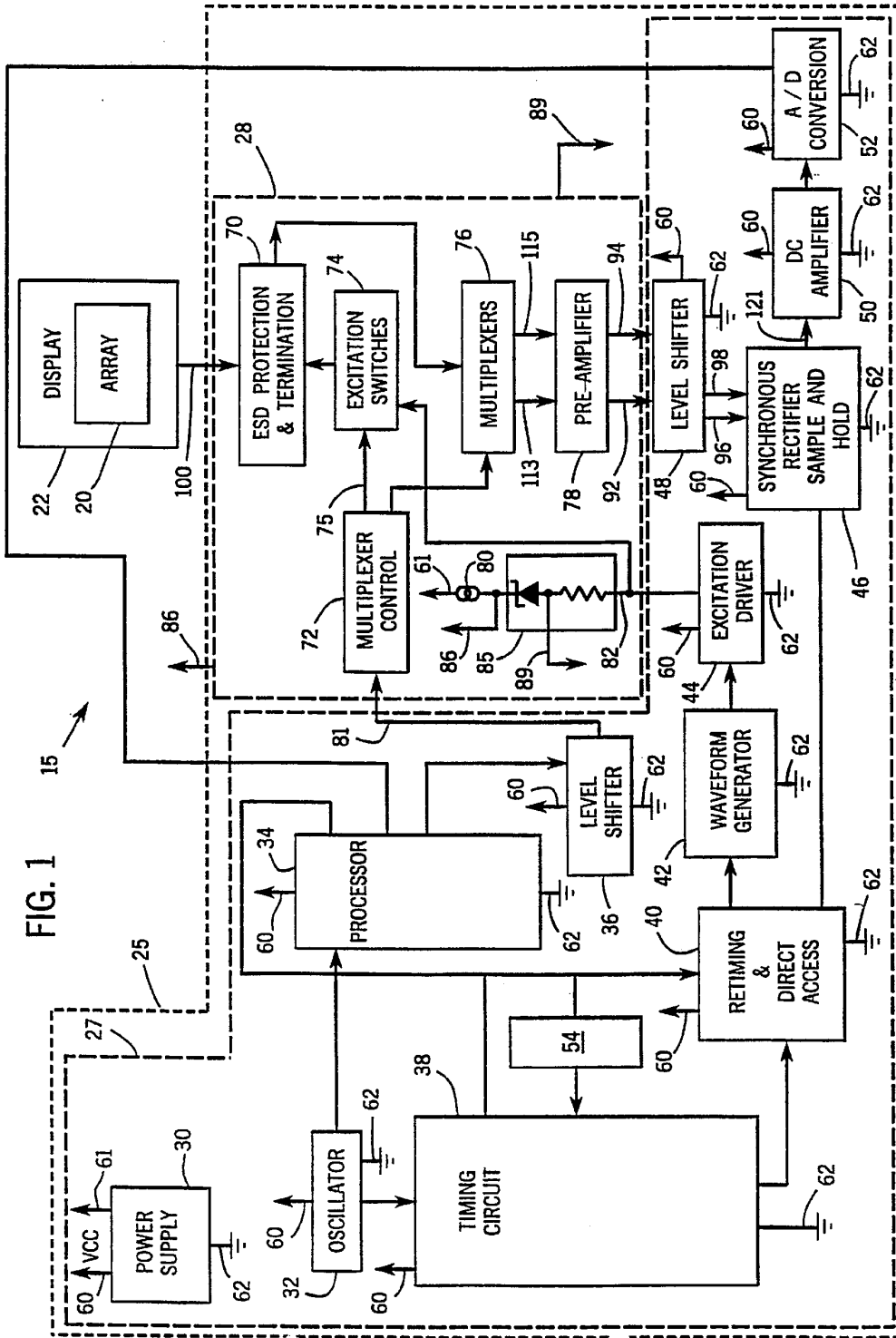


FIG. 1

FIG. 2

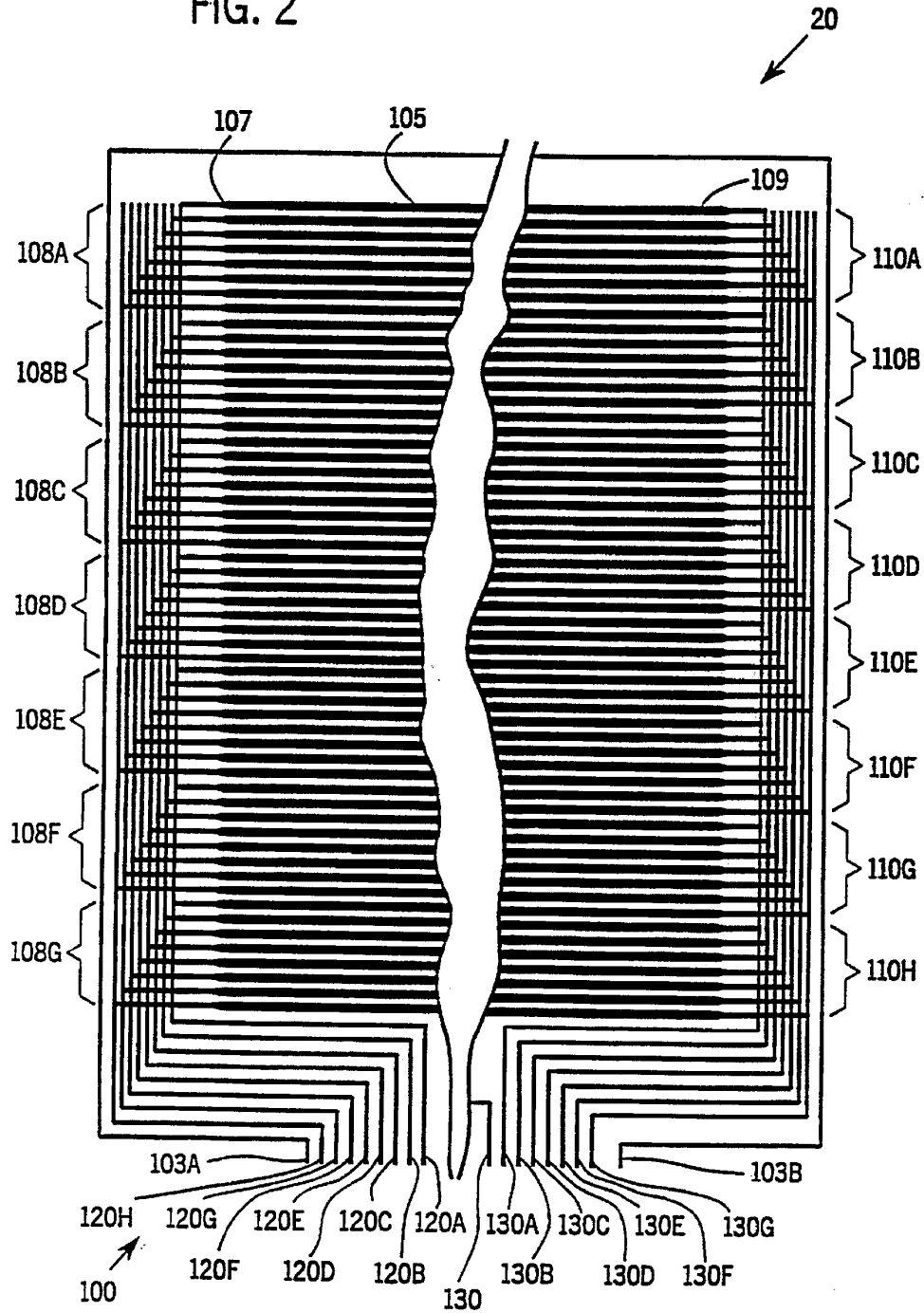
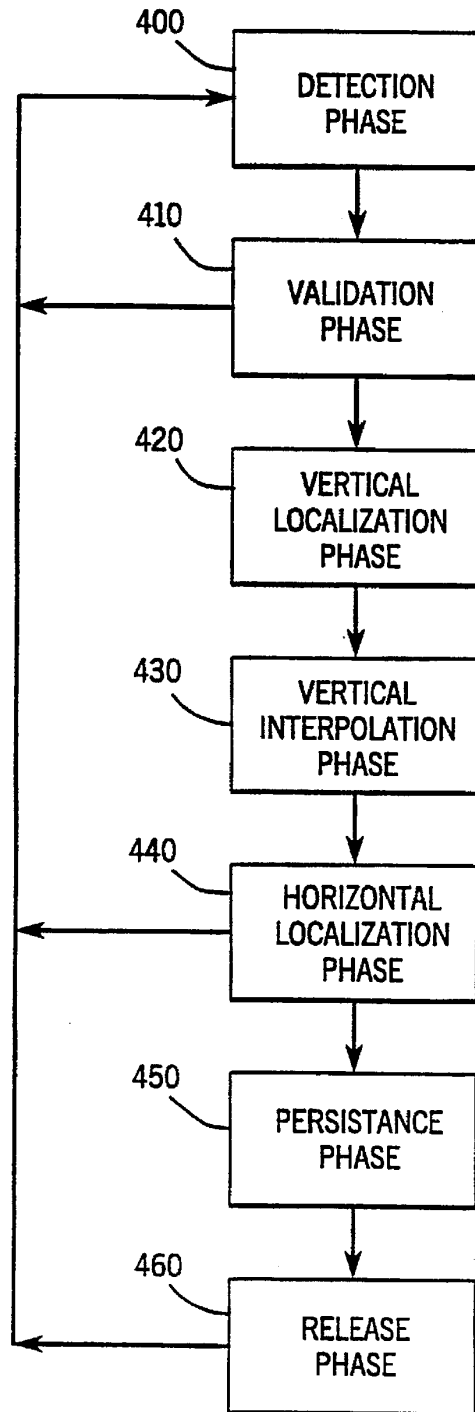


FIG. 3



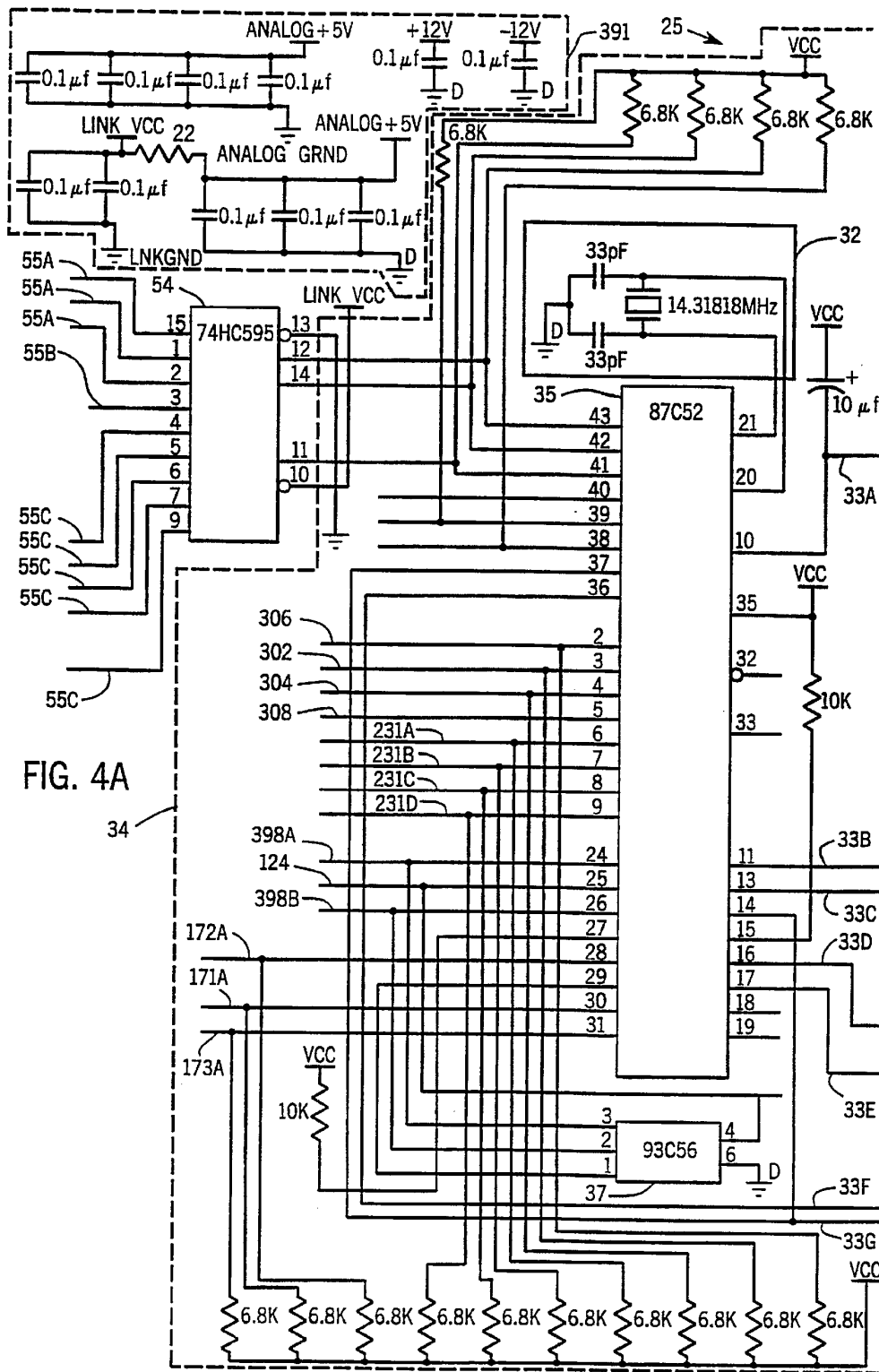


FIG. 4A

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