



US005650597A

**United States Patent** [19]  
**Redmayne**

[11] **Patent Number:** **5,650,597**  
[45] **Date of Patent:** **Jul. 22, 1997**

[54] **CAPACITIVE TOUCH SENSOR**  
[75] **Inventor:** **Derek V. Redmayne**, Delta, Canada  
[73] **Assignee:** **Dynapro Systems, Inc.**, New Westminister, Canada

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

[21] **Appl. No.:** **375,592**  
[22] **Filed:** **Jan. 20, 1995**  
[51] **Int. Cl.<sup>6</sup>** ..... **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**

*Primary Examiner*—Curtis Kuntz  
*Assistant Examiner*—Paul Loomis  
*Attorney, Agent, or Firm*—Foley & Lardner

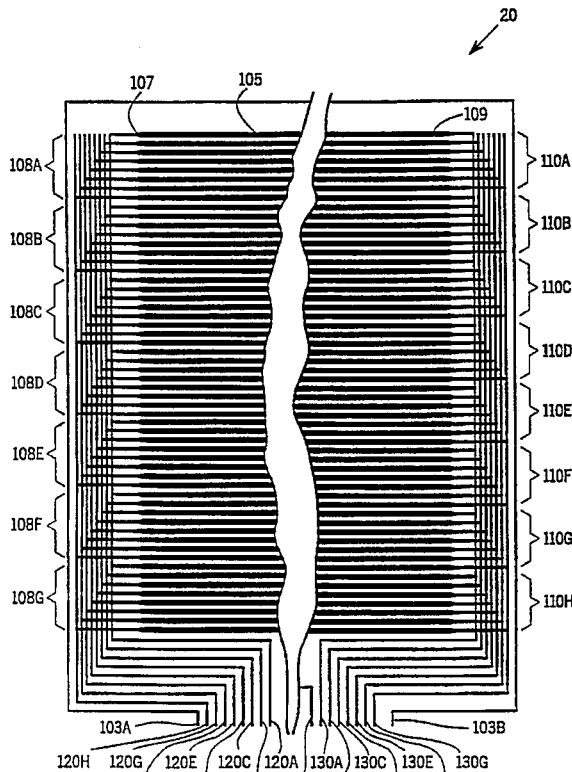
[57] **ABSTRACT**

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.

[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. .	

**22 Claims, 13 Drawing Sheets**



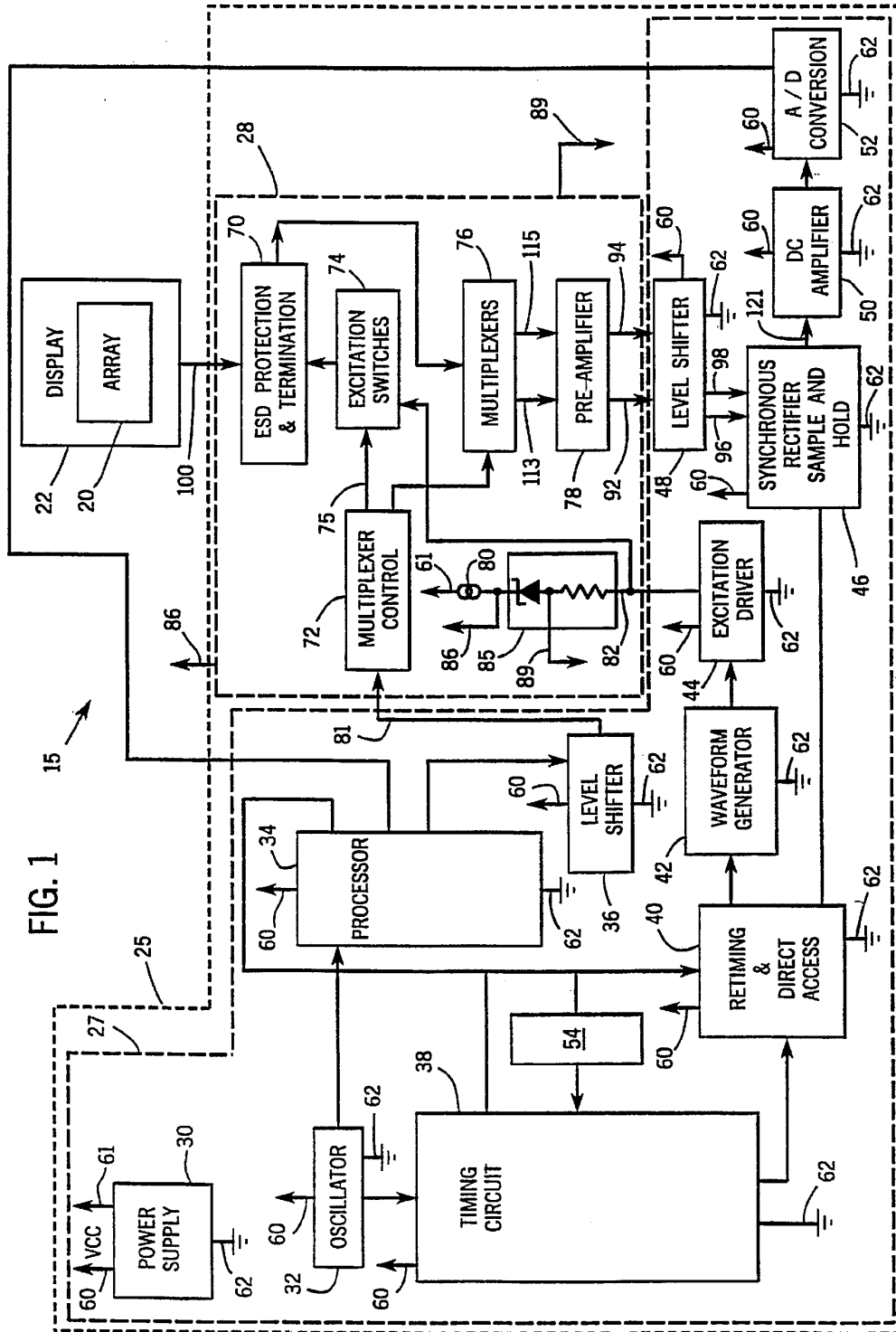


FIG. 1

FIG. 2

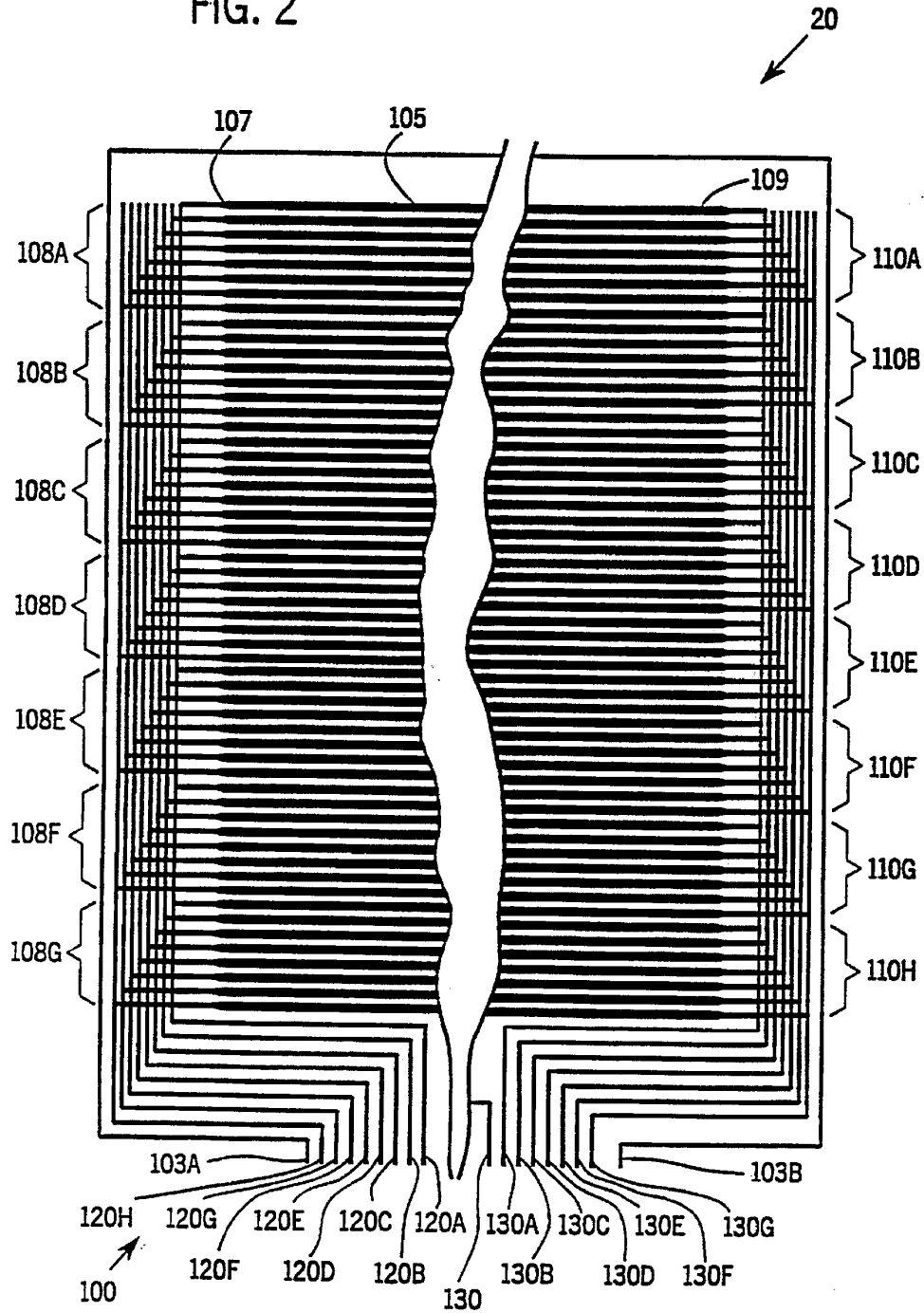
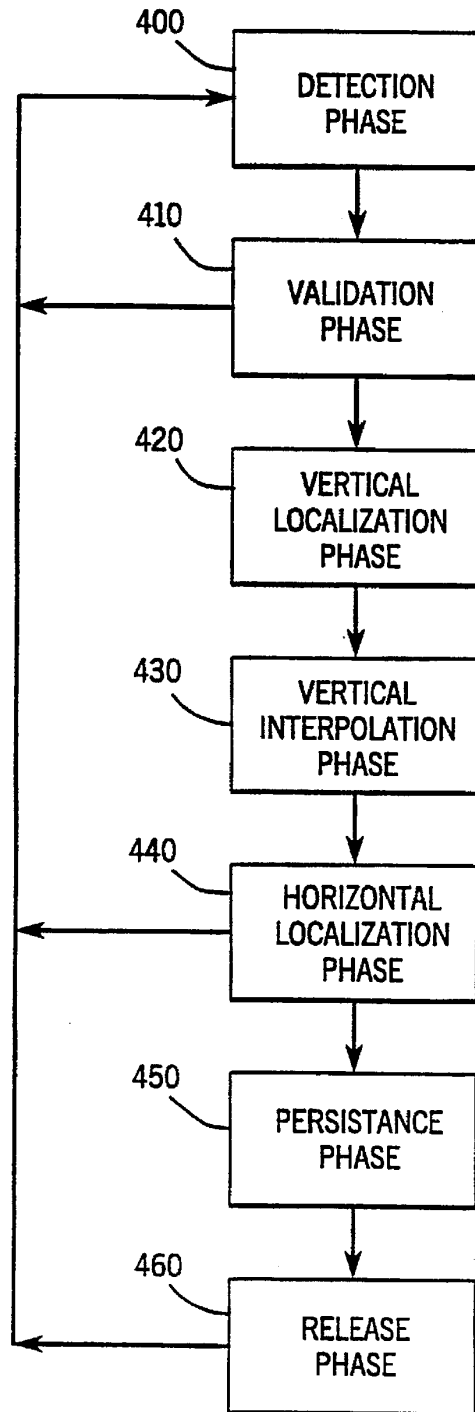


FIG. 3



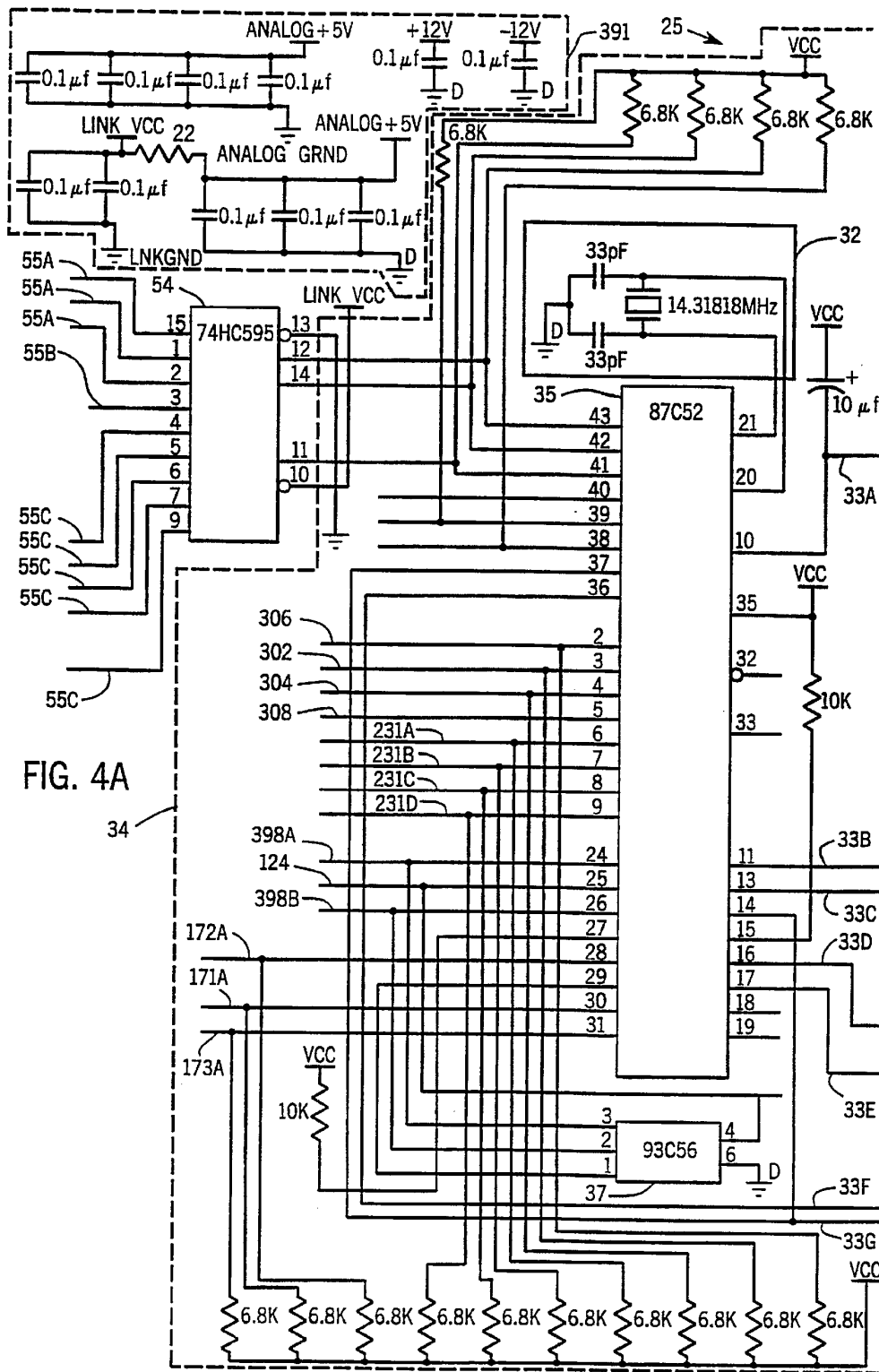


FIG. 4A

34

# Explore Litigation Insights

Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

## Real-Time Litigation Alerts



Keep your litigation team up-to-date with **real-time alerts** and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

## Advanced Docket Research



With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

## Analytics At Your Fingertips



Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

## API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

## LAW FIRMS

Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

## FINANCIAL INSTITUTIONS

Litigation and bankruptcy checks for companies and debtors.

## E-DISCOVERY AND LEGAL VENDORS

Sync your system to PACER to automate legal marketing.