

US005796183A

United States Patent [19]  
Hourmand

[11] Patent Number: 5,796,183  
[45] Date of Patent: Aug. 18, 1998

- [54] CAPACITIVE RESPONSIVE ELECTRONIC SWITCHING CIRCUIT
- [75] Inventor: Byron Hourmand, Hersey, Mich.
- [73] Assignee: Nartron Corporation, Reed City, Mich.
- [21] Appl. No.: 601,268
- [22] Filed: Jan. 31, 1996
- [51] Int. Cl.<sup>6</sup> ..... H01H 35/00
- [52] U.S. Cl. .... 307/116; 361/181; 307/125; 307/139
- [58] Field of Search ..... 307/112, 113, 307/116, 125, 139, 140, 157; 361/181
- [56] **References Cited**

U.S. PATENT DOCUMENTS

3,549,909	12/1970	Adelson et al. .	
3,641,410	2/1972	Vogelsberg .	
3,651,391	3/1972	Vogelsberg .	
3,666,988	5/1972	Bellis .	
3,798,370	3/1974	Hurst .	
3,879,618	4/1975	Larson .....	307/116
3,899,713	8/1975	Barkan et al. .	
3,911,215	10/1975	Hurst et al. .	
3,919,596	11/1975	Bellis .	
3,965,465	6/1976	Alexander .	
3,984,757	10/1976	Gott et al. .	
4,016,453	4/1977	Moennig .	
4,031,408	6/1977	Holz .	
4,071,689	1/1978	Talmage et al. .	
4,101,805	7/1978	Stone .	
4,119,864	10/1978	Petrizio .	
4,152,629	5/1979	Raupp .	
4,159,473	6/1979	Senk .	
4,210,822	7/1980	Wern .	
4,211,959	7/1980	Deavenport et al. .	
4,213,061	7/1980	Conner .	
4,220,815	9/1980	Gibson et al. .	
4,237,421	12/1980	Waldron .	
4,246,533	1/1981	Chiang .	
4,257,117	3/1981	Besson .	
4,264,831	4/1981	Wern .	
4,289,972	9/1981	Wern .	
4,289,980	9/1981	McLaughlin .	

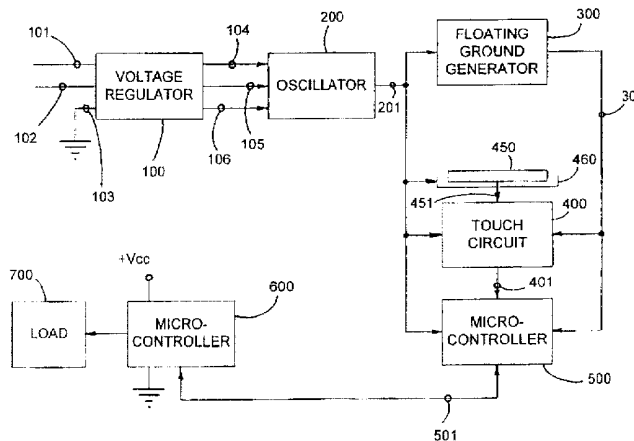
4,308,443	12/1981	Tucker et al. .	
4,323,829	4/1982	Witney et al. .	
4,352,141	9/1982	Kent .....	363/181
4,360,737	11/1982	Leopold .	
4,374,381	2/1983	Ng et al. .	
4,476,463	10/1984	Ng et al. .	
4,503,294	3/1985	Matsumaru .....	200/5 A
4,731,548	3/1988	Ingraham .	
4,758,735	7/1988	Ingraham .	
4,831,279	5/1989	Ingraham .	
4,910,504	3/1990	Eriksson .	
4,939,382	7/1990	Gruodis .	
4,942,631	7/1990	Rosa .....	4/623
5,012,124	4/1991	Hollaway .	
5,066,898	11/1991	Miller et al. .	
5,087,825	2/1992	Ingraham .	
5,208,516	5/1993	Saidian .	
5,233,231	8/1993	Wieth et al. .	
5,235,217	8/1993	Kirton .....	307/326
5,386,219	1/1995	Greanias et al. .	
5,453,644	9/1995	Yap et al. .	
5,572,205	11/1996	Caldwell et al. ....	341/33

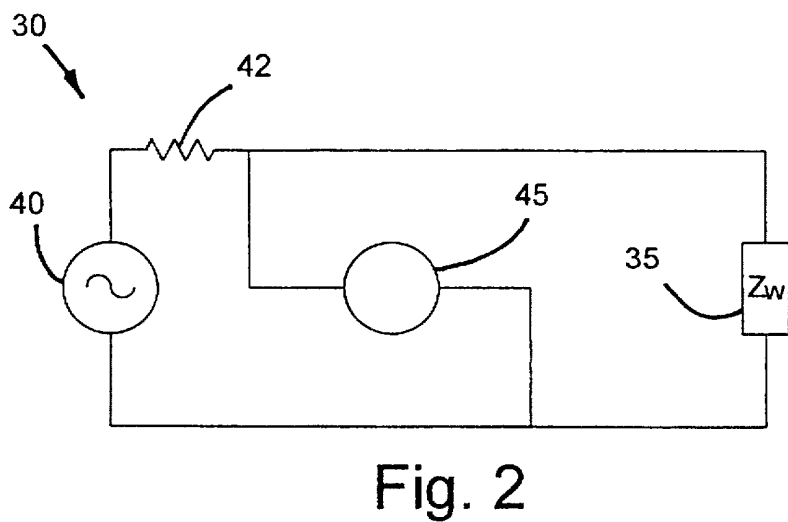
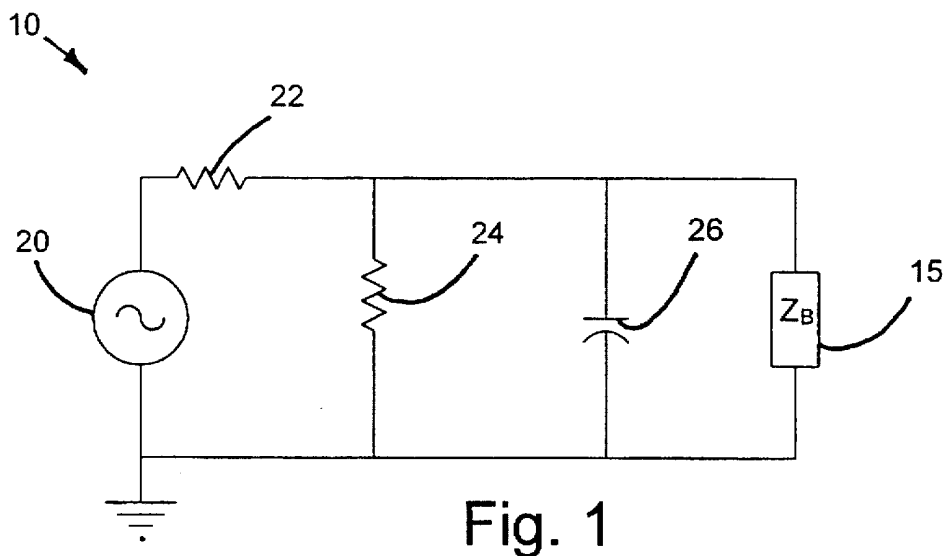
Primary Examiner—William M. Shoop, Jr.  
Assistant Examiner—Jonathan Kaplan  
Attorney, Agent, or Firm—Price, Heneveld, Cooper, DeWitt & Litton

[57] ABSTRACT

A capacitive responsive electronic switching circuit comprises an oscillator providing a periodic output signal having a frequency of 50 kHz or greater, an input touch terminal defining an area for an operator provide an input by proximity and touch, and a detector circuit coupled to the oscillator for receiving the periodic output signal from the oscillator, and coupled to the input touch terminal. The detector circuit being responsive to signals from the oscillator and the presence of an operator's body capacitance to ground coupled to the touch terminal when in proximity or touched by an operator to provide a control output signal. Preferably, the oscillator provides a periodic output signal having a frequency of 800 kHz or greater. An array of touch terminals may be provided in close proximity due to the reduction in crosstalk that may result from contaminants by utilizing an oscillator outputting a signal having a frequency of 50 kHz or greater.

32 Claims, 13 Drawing Sheets





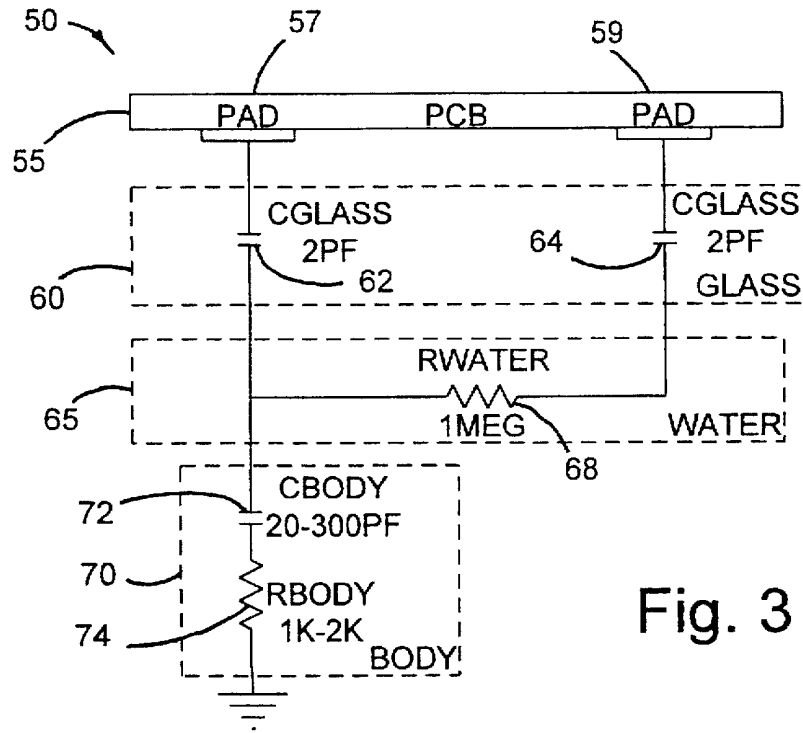


Fig. 3

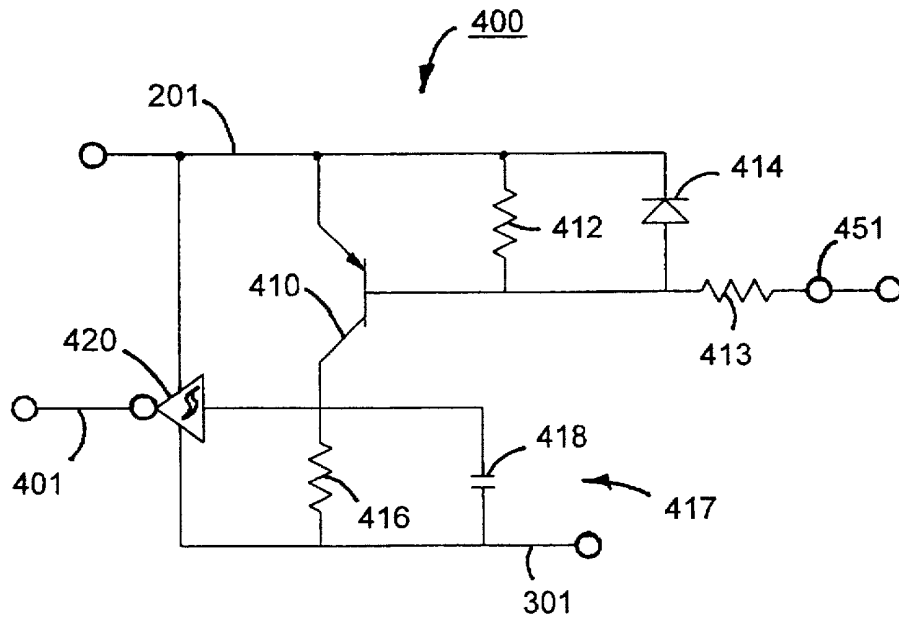


Fig. 8

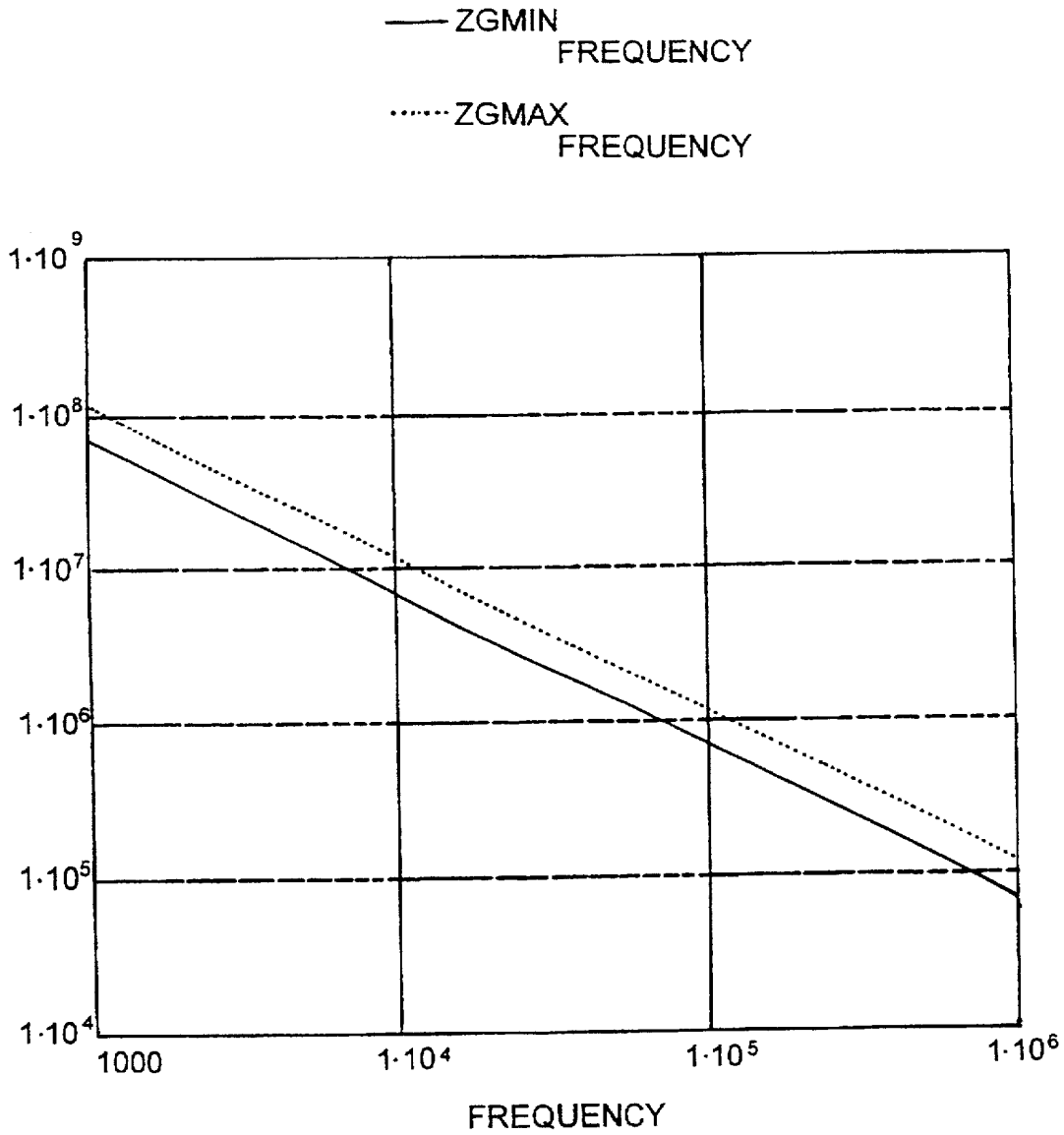


Fig. 3A

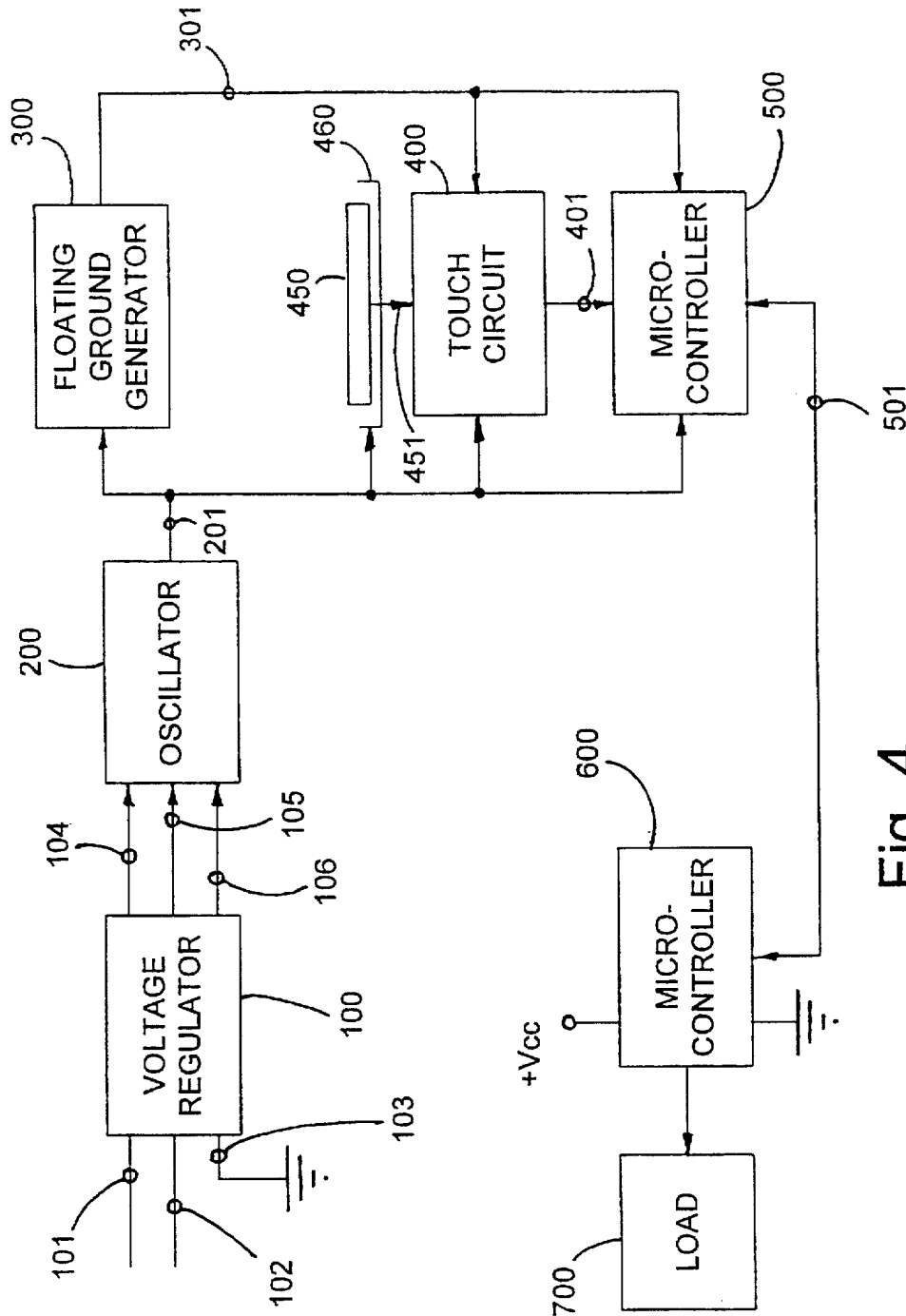


Fig. 4

# 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.