

(54) **DIGITAL PIEZOELECTRIC TRANSDUCERS AND METHODS**

(75) Inventor: **Gritsko Perez**, Evington, VA (US)  
(73) Assignee: **Ericsson Inc.**, Research Triangle Park, NC (US)

(\*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **09/009,520**

(22) Filed: **Jan. 20, 1998**

(51) **Int. Cl.**<sup>7</sup> ..... **H01L 41/04**  
(52) **U.S. Cl.** ..... **310/324; 310/334**  
(58) **Field of Search** ..... **310/324, 334, 310/366**

(56) **References Cited**

**U.S. PATENT DOCUMENTS**

3,153,229	A	*	10/1964	Roberts	.....	310/328
3,947,708	A		3/1976	Fulenwider	.....	310/330
4,515,997	A	*	5/1985	Stinger, Jr.	.....	341/151
4,885,781	A	*	12/1989	Seidel	.....	310/324
5,821,666	A	*	10/1998	Matsumoto et al.	...	310/316.01

**FOREIGN PATENT DOCUMENTS**

GB	1382927	2/1975
JP	58200698	11/1983
JP	59128900	7/1984
JP	59188295	10/1984

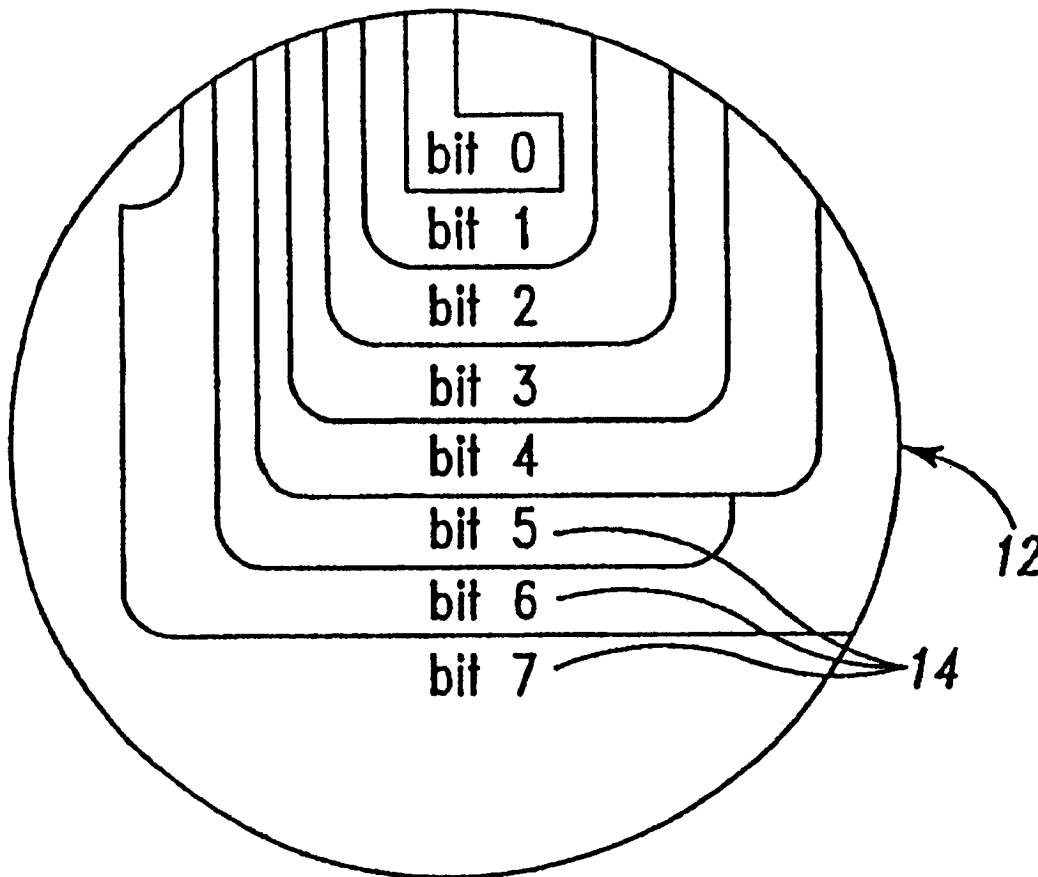
\* cited by examiner

*Primary Examiner*—Nestor Ramirez  
*Assistant Examiner*—Peter Medley  
(74) *Attorney, Agent, or Firm*—Myers Bigel Sibley & Sajovec

(57) **ABSTRACT**

A digitally driven piezoelectric transducer uses a flat piezoelectric element having a plurality of electrically isolated conductive sections coupled to one side of said piezoelectric element and a conductive ground plate coupled to another side of said piezoelectric element. In addition, a resonant cavity is coupled to said piezoelectric element and intensifies the acoustic or sound energy produced by said piezoelectric transducer. This digitally driven piezoelectric transducer avoids the problems associated with electromagnetic interference by avoiding additional analog circuitry previously needed to create sound audible for humans.

**20 Claims, 7 Drawing Sheets**



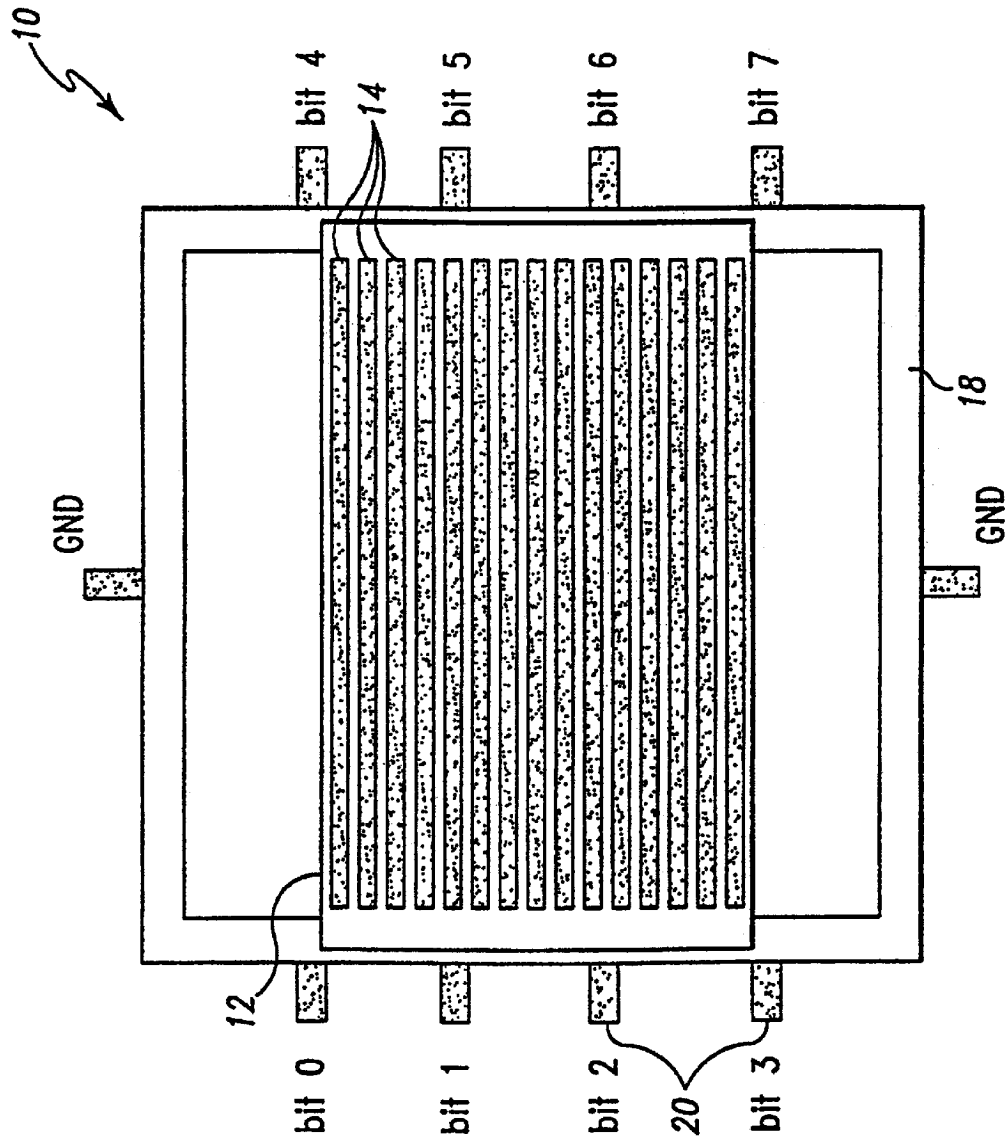


Fig. 1

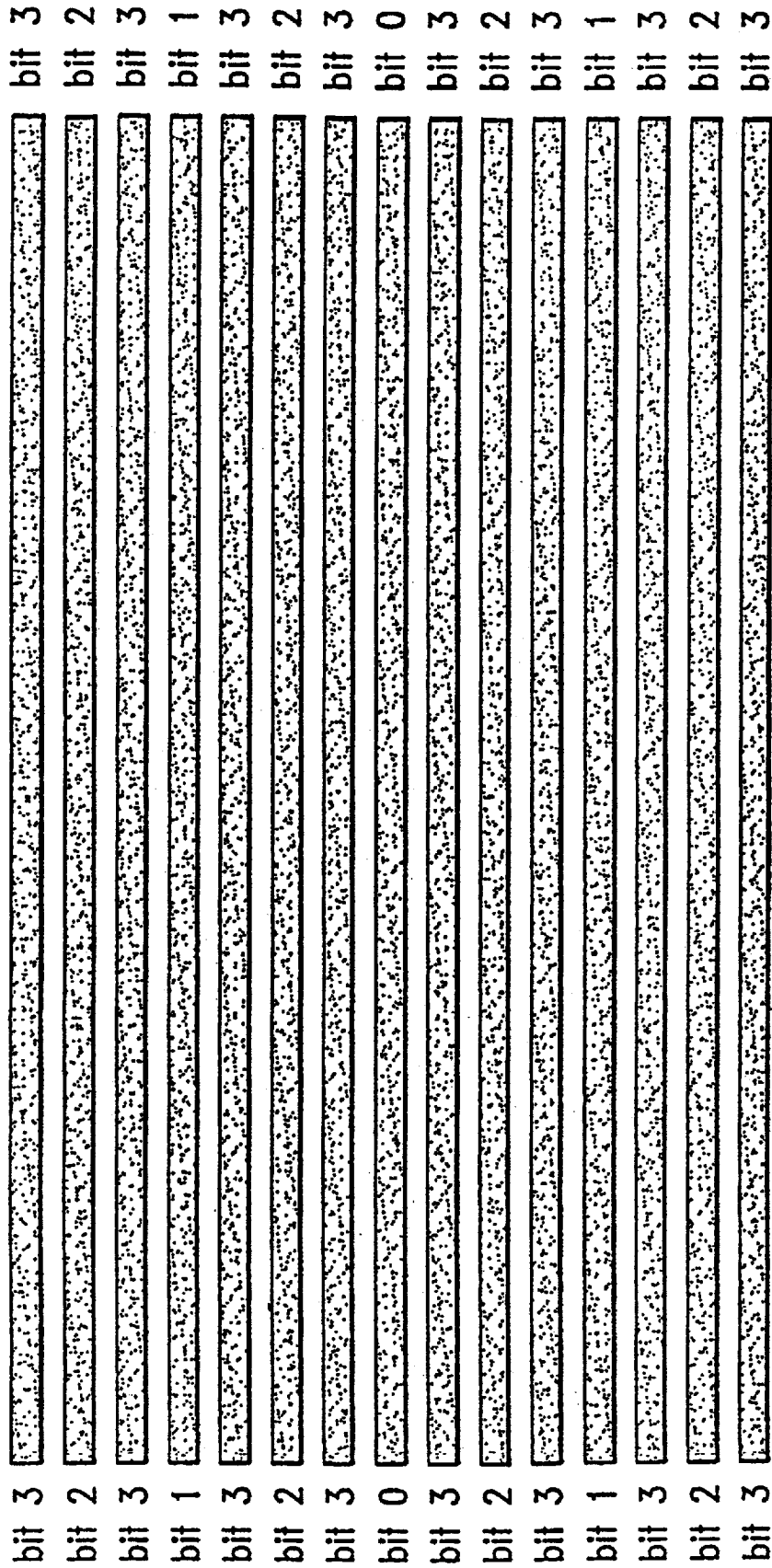


Fig. 1A

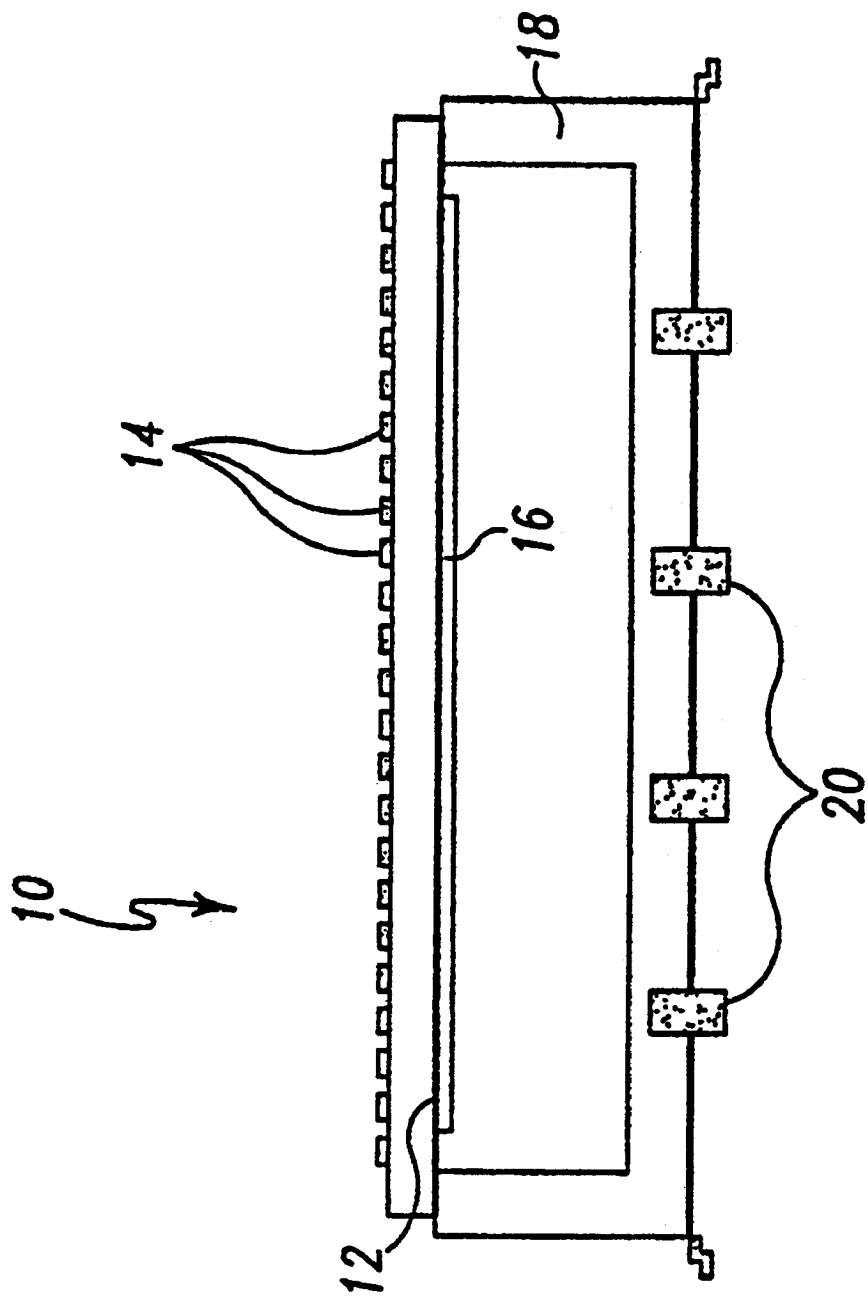


Fig. 2

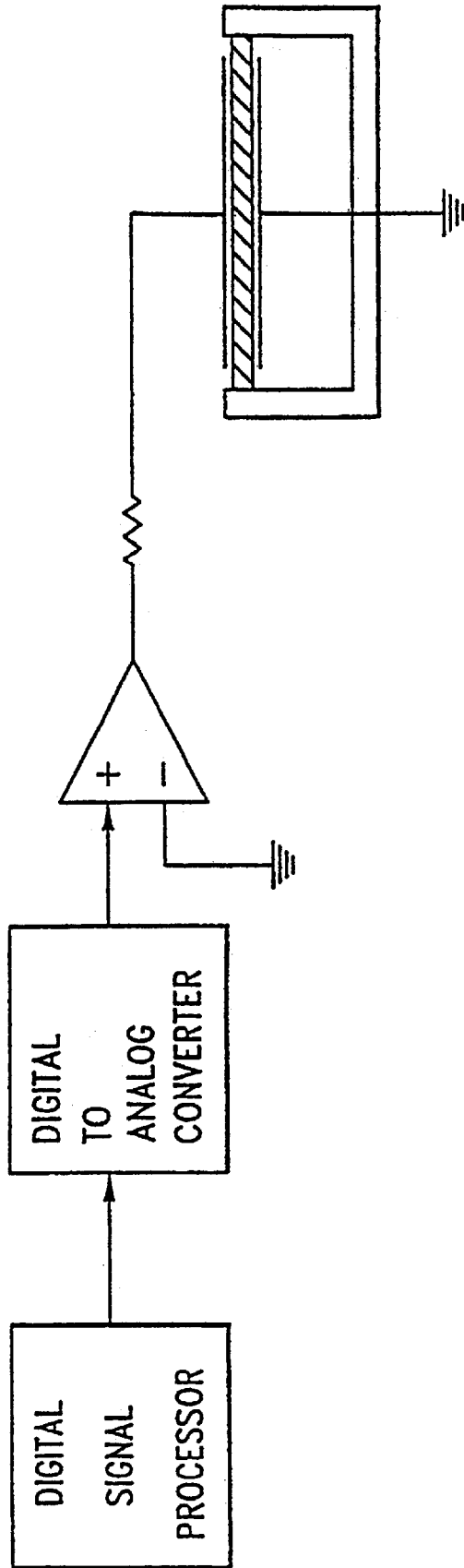


Fig. 3  
(PRIOR ART)

# 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.