

**(12) United States Patent Sill**

**(10) Patent No.: US 6,284,110 B1**  
**(45) Date of Patent: Sep. 4, 2001**

**(54) METHOD AND APPARATUS FOR RADIO FREQUENCY ISOLATION OF LIQUID HEAT TRANSFER MEDIUM SUPPLY AND DISCHARGE LINES**

0596551 A	5/1994	(EP)	.....	H01J/37/32
0887836 A	12/1998	(EP)	.....	H01J/37/32
58045378 A	3/1983	(JP)	.....	C23L/15/00
10303132 A	11/1998	(JP)	.....	H01L/21/205
9742648 A	11/1997	(WO)	.....	H01J/37/32

**(75) Inventor: Edward L. Sill, Phoenix, AZ (US)**

**(73) Assignee: Tokyo Electron Limited, Tokyo (JP)**

\* cited by examiner

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

*Primary Examiner*—Nam Nguyen  
*Assistant Examiner*—Steven H. Ver Steeg  
**(74) Attorney, Agent, or Firm**—Wood, Herron & Evans, LLP

**(21) Appl. No.: 09/291,890**

**(22) Filed: Apr. 14, 1999**

**(57) ABSTRACT**

**(51) Int. Cl.<sup>7</sup> ..... C23C 14/34**

**(52) U.S. Cl. .... 204/298.09; 118/58; 156/345; 165/177; 165/181; 165/184**

A passive first-order band reject, or notch, filter characteristic is introduced into a supply and/or return line (18, 20) of a heat transfer system (12) that uses electrically conductive liquid heat transfer medium in contact with radio frequency electrified components (14) typical in sputtering or etching manufacturing equipment. The heat transfer medium line (20) is coiled to create an inherent inductance (L2). A capacitive element (C2) is operatively connected across the coil (29) in the heat transfer medium line (20), the amount of capacitance chosen so that the resonant frequency is at the RF frequency of the components (14) being thermally conditioned. Thus, a high impedance is created for that frequency. The coil (29) and capacitor (C2) combination is protected from physical and electromagnetic interference by an enclosure (44).

**(58) Field of Search ..... 204/298.09; 118/58; 156/345; 165/181, 184**

**(56) References Cited**

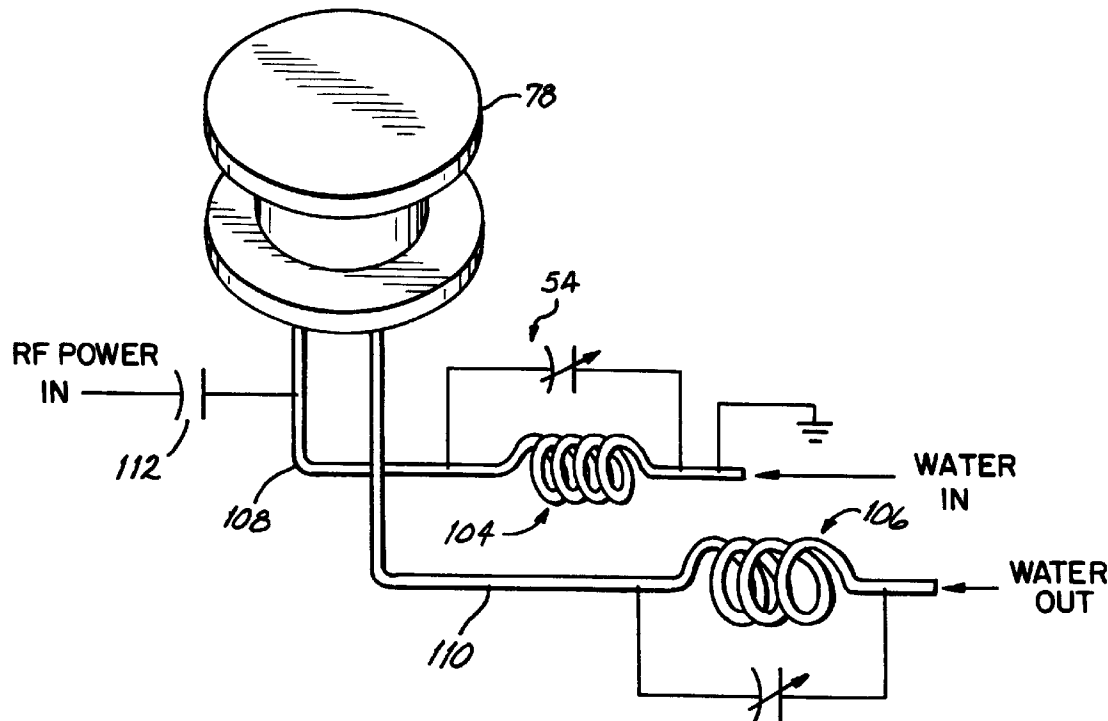
**U.S. PATENT DOCUMENTS**

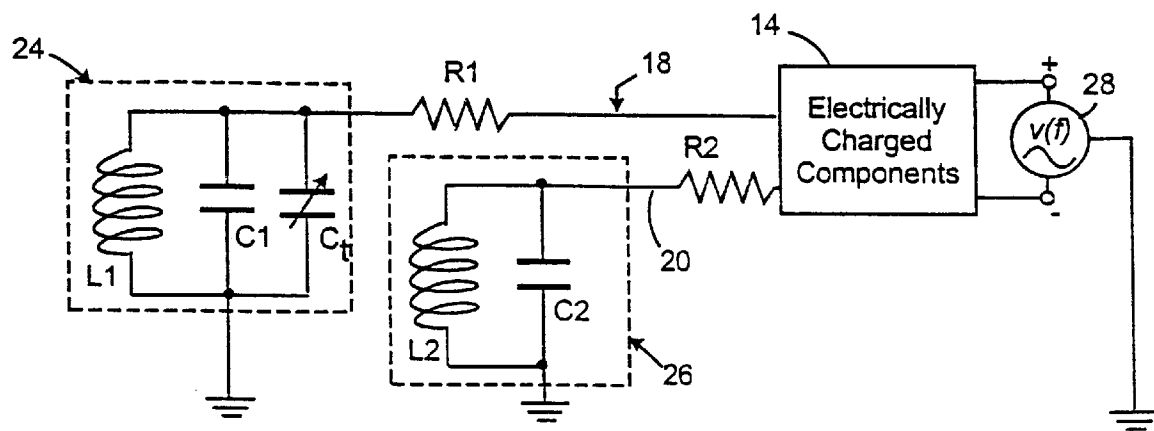
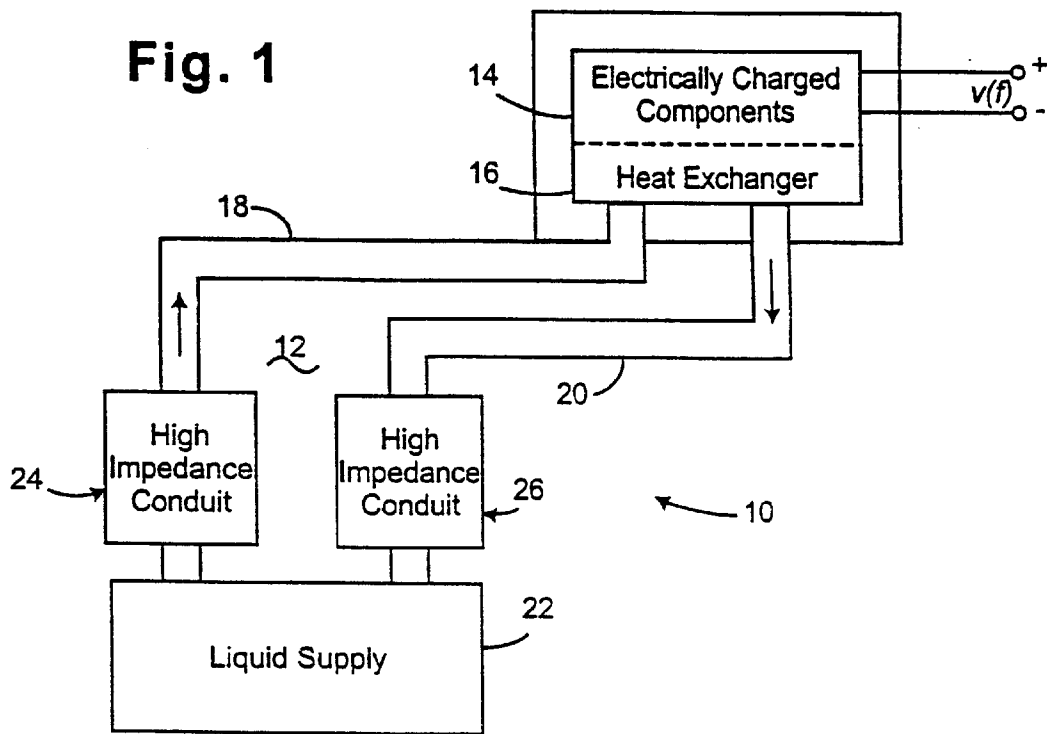
4,849,675	7/1989	Müller	.....	315/111.51
5,334,302 *	8/1994	Kubo et al.	.....	204/298.18
5,628,889 *	5/1997	Gardell et al.	.....	204/298.09
5,660,740 *	8/1997	Komino	.....	216/67
5,906,683 *	5/1999	Chen et al.	.....	118/724
5,935,396 *	8/1999	Buckfeller et al.	.....	204/298.09

**FOREIGN PATENT DOCUMENTS**

0184812 A	6/1986	(EP)	.....	H05H/1/46
-----------	--------	------	-------	-----------

**16 Claims, 5 Drawing Sheets**





**Fig. 2**

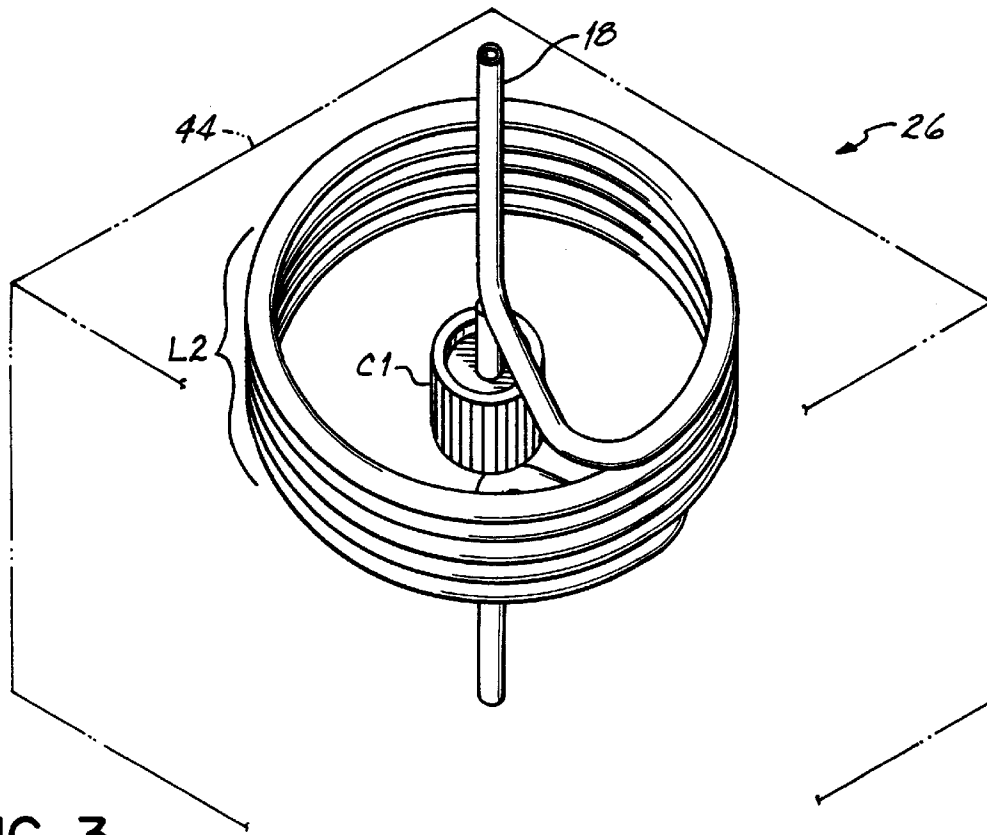


FIG. 3

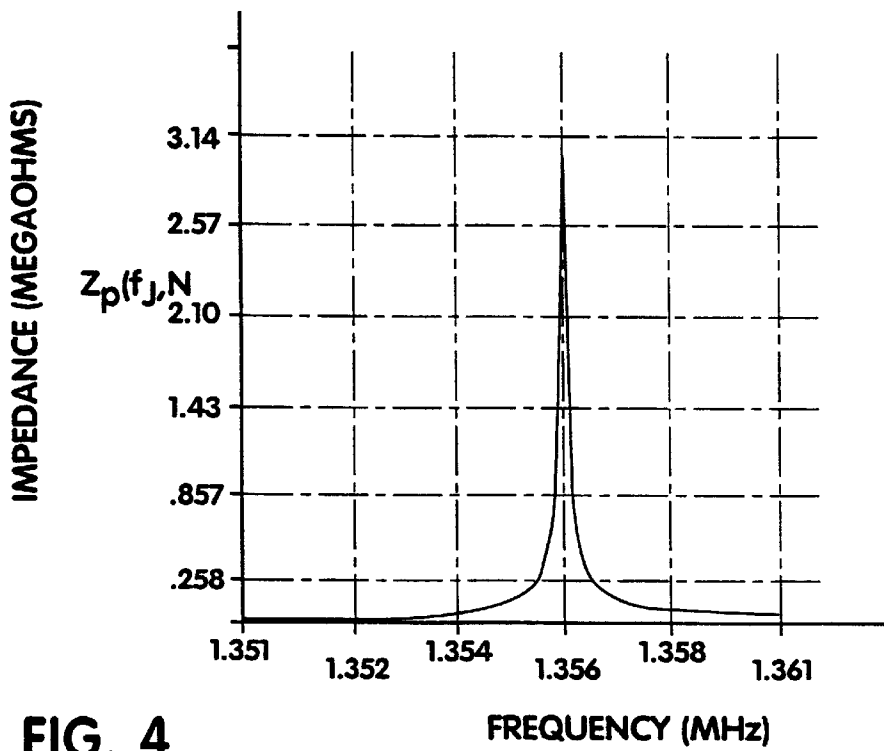


FIG. 4

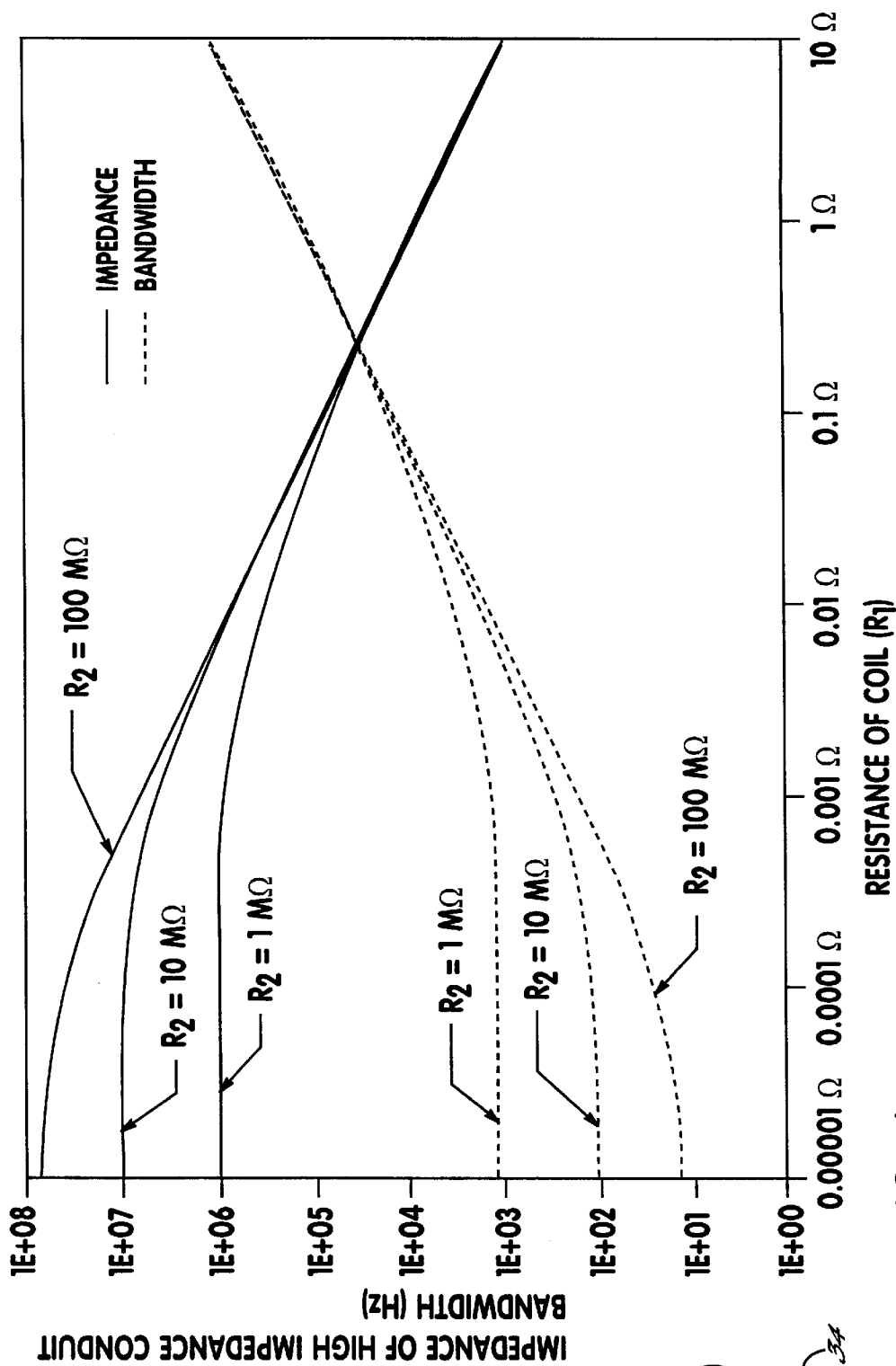


FIG. 6

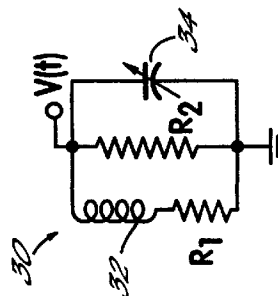


FIG. 5

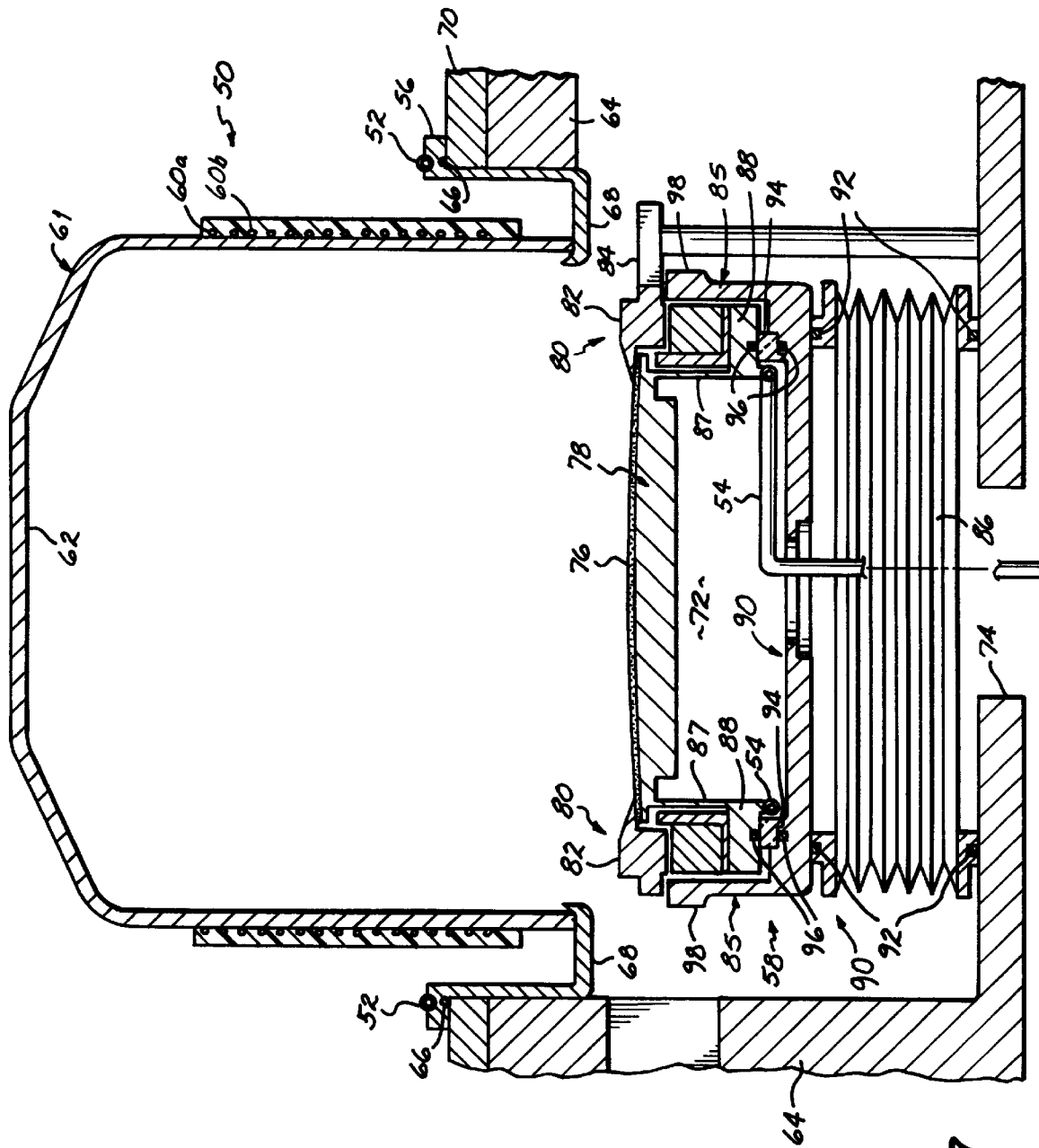


FIG. 7

# 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.