



[54] **PARALLEL-PIPELINED IMAGE PROCESSING SYSTEM**

[75] Inventors: **Robert G Bassman**, Austin, Tex.; **Bhaves B. Bhatt**, Franklin Park; **Bill J. Call**, Allentown, both of N.J.; **Michael W. Hansen**, New Hope, Pa.; **Stephen C. Hsu**, East Windsor, N.J.; **Gooitzen S. van der Wal**, Hopewell, N.J.; **Lambert E. Wixson**, Rocky Hill, N.J.

5,175,824	12/1992	Soderbery et al.	395/325
5,255,374	10/1993	Alderguia et al.	395/325
5,261,059	11/1993	Hedberg et al.	395/312
5,281,964	1/1994	Iida et al.	340/936
5,283,573	2/1994	Takatou et al.	340/937
5,313,295	5/1994	Taniguchi et al.	348/149
5,359,674	10/1994	van der Wal	382/41
5,586,227	12/1996	Kawana et al.	395/112
5,592,237	1/1997	Greenway et al.	348/716
5,717,871	2/1998	Hsieh et al.	395/312

[73] Assignee: **Sarnoff Corporation**, Princeton, N.J.

FOREIGN PATENT DOCUMENTS

WO9411852 5/1994 WIPO ..... G08G 1/015

[21] Appl. No.: **08/606,171**

OTHER PUBLICATIONS

[22] Filed: **Feb. 23, 1996**

English Language Abstract of WO 94/11852, Nov. 10, 1992.  
 Traitement Du Signal, vol. 9. No. 4, 1992 Maciej Orkisz:  
 "Localisation D'Objets Mobiles Dans des Scenes Naturelles  
 Filmees par Une Camera Fixe".

Related U.S. Application Data

[63] Continuation-in-part of application No. 08/372,924, Jan. 17, 1995, abandoned.

Two-Dimensional Vehicle Tracking using Video-Image  
 Processing, Sep. 2, 1992, Yamamoto, Kuwahara and Misra  
 (Presented at the 3rd Vehicle Navigation & Information  
 Systems Conference, Oslo, Norway, Sep. 2-4, 1992.

[60] Provisional application No. 60/006,097, Oct. 31, 1995.

International Search Report from corresponding PCT appli-  
 cation PCT/US96/00022.

[51] **Int. Cl.<sup>7</sup>** ..... **G06K 9/00**  
 [52] **U.S. Cl.** ..... **382/103; 382/325; 710/129;**  
 710/132

Hierarchical Model-Based Motion Estimation, Mar. 23,  
 1992, James R. Bergen et al., (appearing in Proc. of Euro-  
 pean Conference on Computer Vision-92).

[58] **Field of Search** ..... 382/103, 107,  
 382/296, 307, 325; 395/800, 312, 309;  
 364/516; 348/149, 716; 701/1; 710/126,  
 129, 131, 132

*Primary Examiner*—Jose L. Couso  
*Assistant Examiner*—Matthew C. Bella  
*Attorney, Agent, or Firm*—William J. Burke

[56] **References Cited**

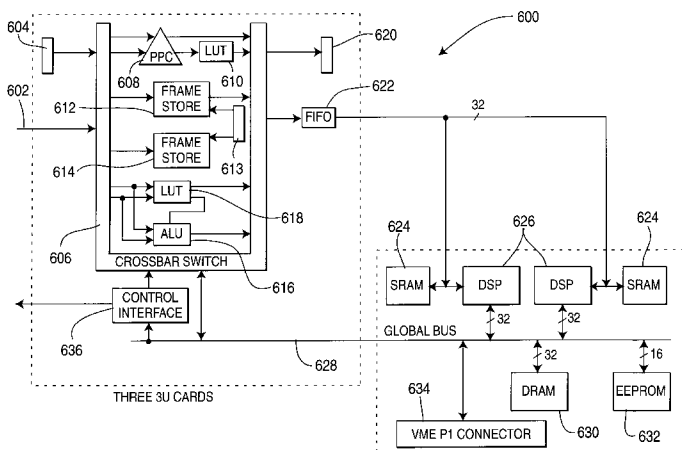
[57] **ABSTRACT**

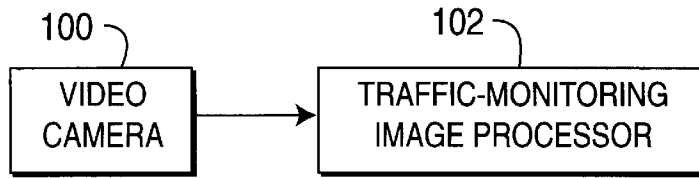
U.S. PATENT DOCUMENTS

4,163,257	7/1979	White	358/133
4,187,519	2/1980	Vitols et al.	358/169
4,214,265	7/1980	Olesen	358/93
4,433,325	2/1984	Tanaka et al.	340/937
4,490,851	12/1984	Gerhart et al.	382/43
4,692,806	9/1987	Anderson et al.	358/209
4,839,648	6/1989	Beucher et al.	340/933
4,847,772	7/1989	Michalopoulos et al.	364/436
4,858,113	8/1989	Saccardi	395/312
4,908,874	3/1990	Gabriel	382/296
5,034,986	7/1991	Karmann et al.	382/1
5,062,056	10/1991	Lo et al.	364/516
5,161,107	11/1992	Mayeaux et al.	364/436

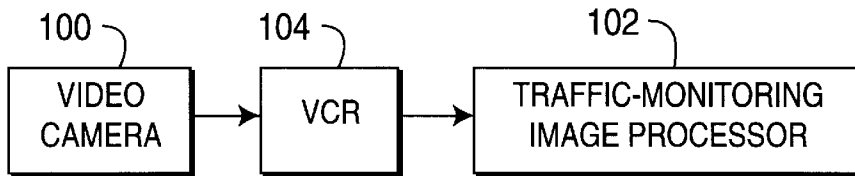
Apparatus for image processing a sequence of images con-  
 taining a parallel-pipelined image processor comprised of  
 image memories, a pyramid processing circuit, an arithmetic  
 logic unit, a crossbar switch for video routing through the  
 various components of the processor, signal processors to  
 provide hardware programming through a global bus and  
 also perform image processing operations. Images can be  
 passed directly from the crossbar switch to internal static  
 RAM of the signal processors through a first-in, first-out  
 interface at full video rates.

26 Claims, 5 Drawing Sheets

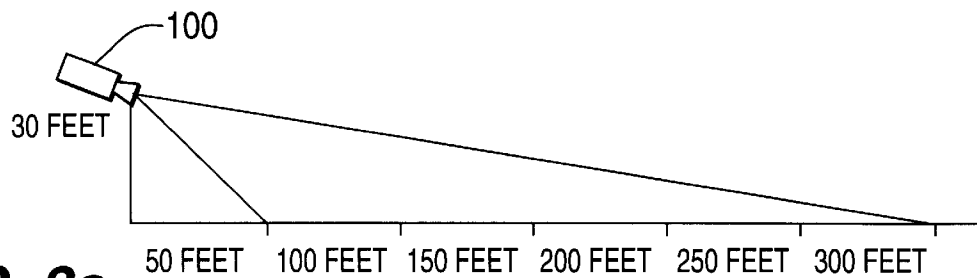




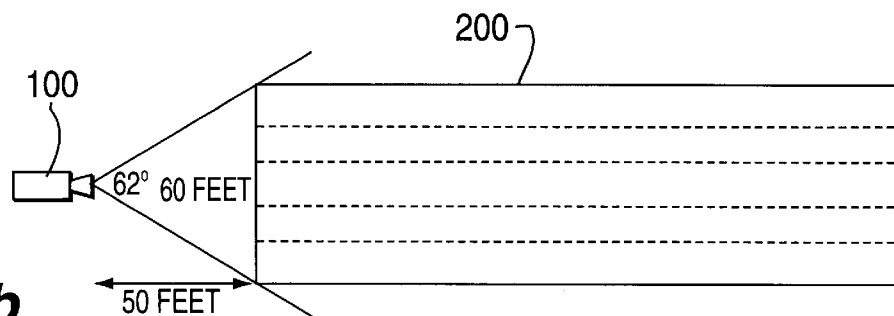
**FIG. 1a**



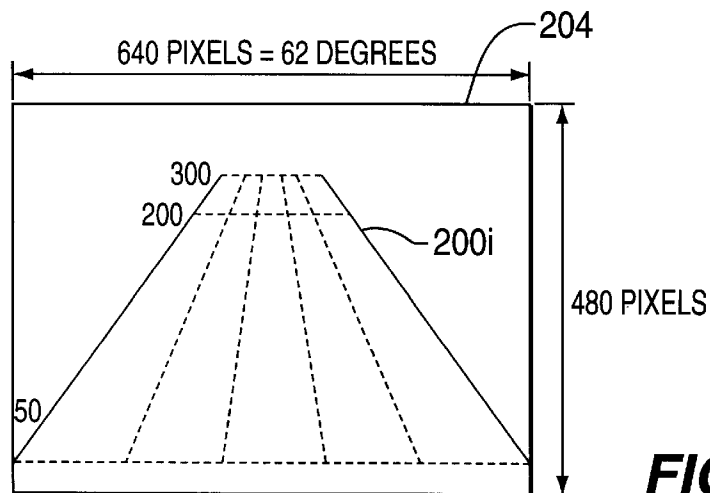
**FIG. 1B**



**FIG. 2a**



**FIG. 2b**



**FIG. 2c**

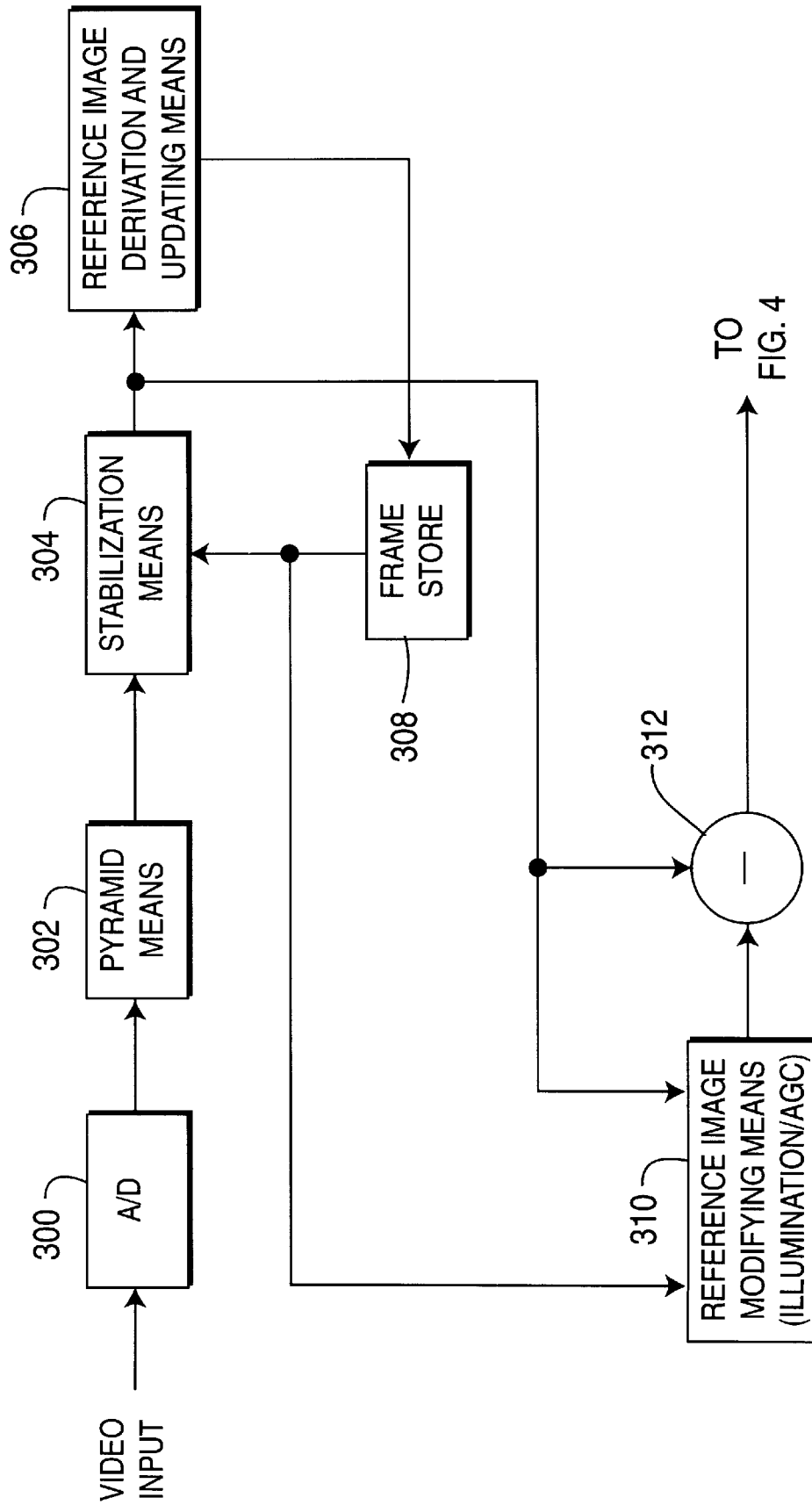


FIG. 3

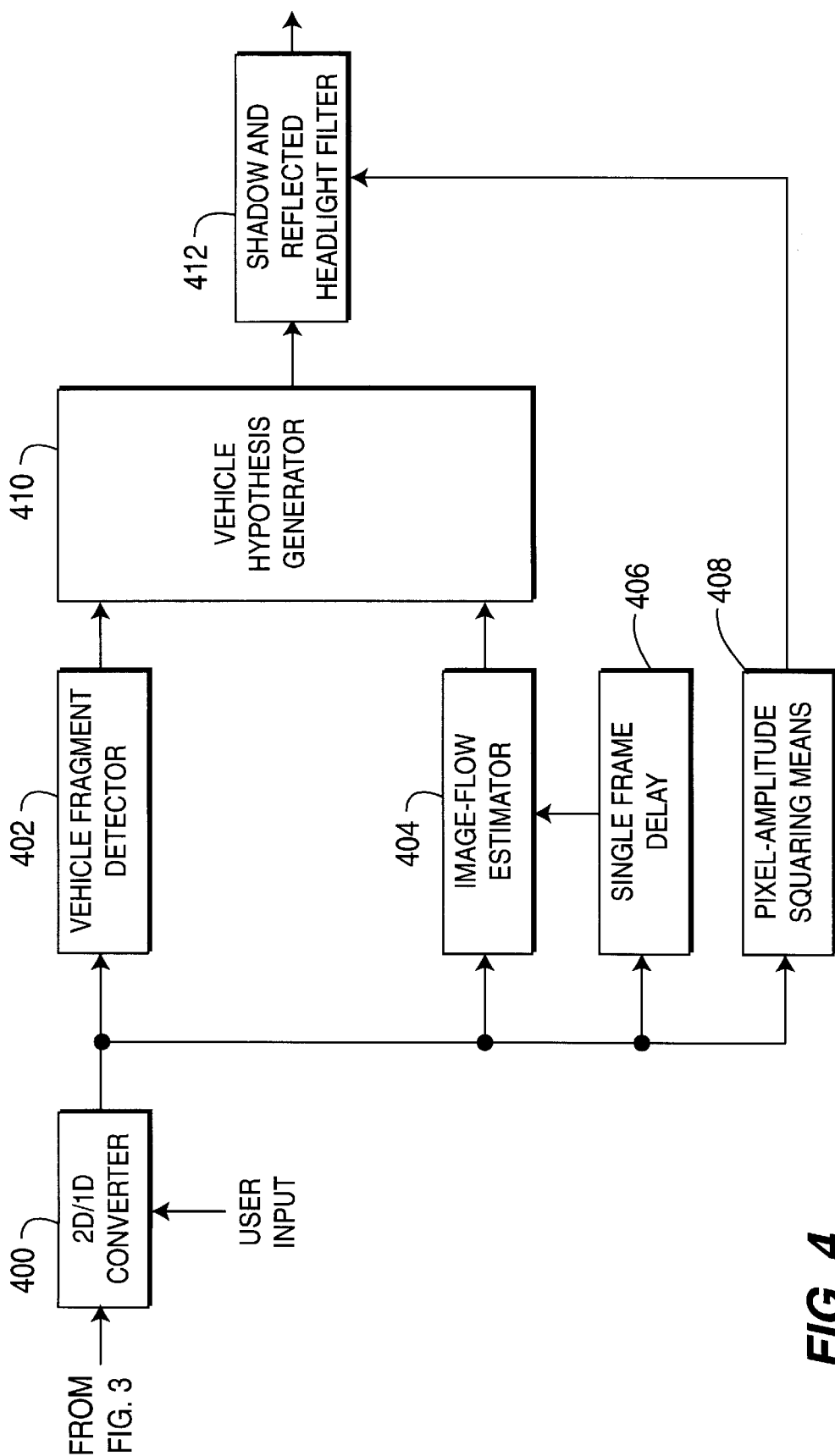
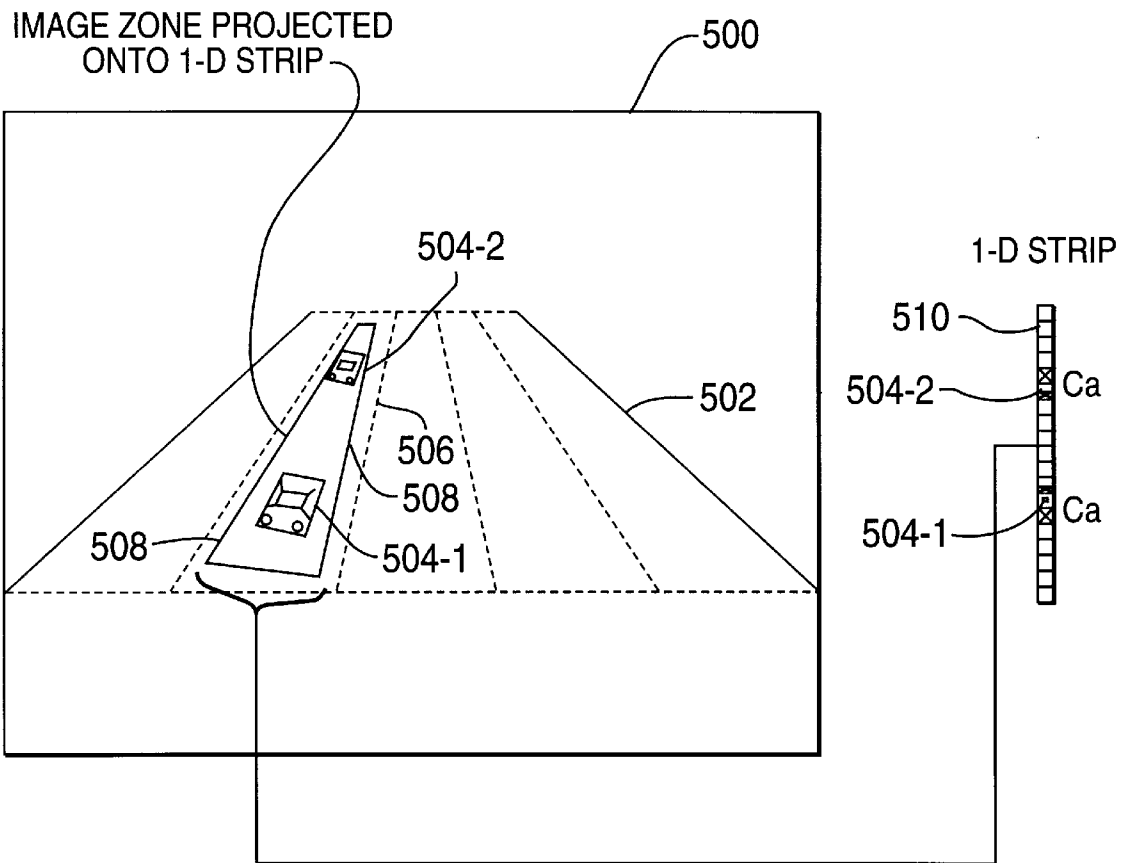
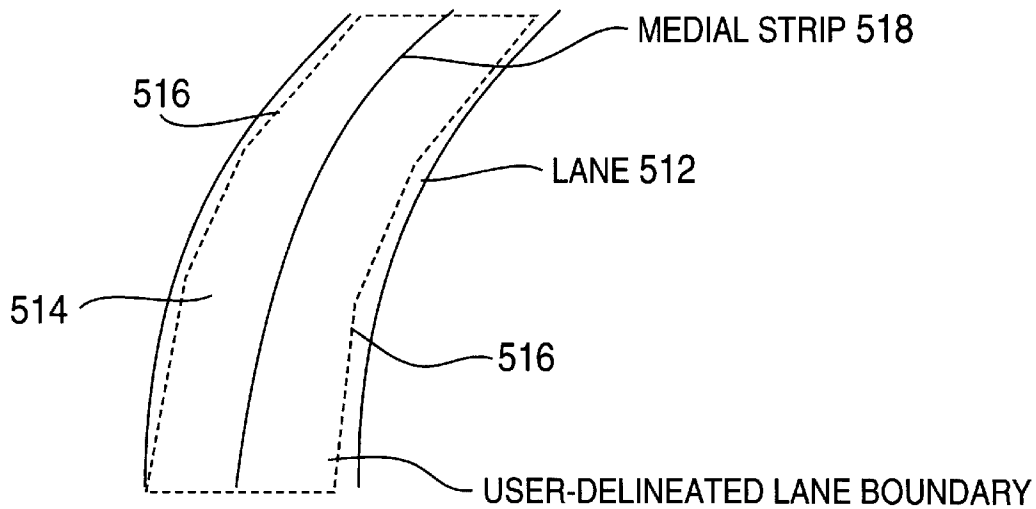


FIG. 4



**FIG. 5**



**FIG. 5a**

# 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.