



US006338122B1

(12) **United States Patent**
Baumgartner et al.

(10) **Patent No.:** **US 6,338,122 B1**
(45) **Date of Patent:** **Jan. 8, 2002**

(54) **NON-UNIFORM MEMORY ACCESS (NUMA) DATA PROCESSING SYSTEM THAT SPECULATIVELY FORWARDS A READ REQUEST TO A REMOTE PROCESSING NODE**

FOREIGN PATENT DOCUMENTS

EP 0379771 A2 8/1990
EP 0608638 A1 8/1994
EP 0817072 A2 1/1998

* cited by examiner

Primary Examiner—Tuan V. Thai

(74) *Attorney, Agent, or Firm*—Casimer K. Salys; Bracewell & Patterson, L.L.P.

(75) **Inventors:** **Yoanna Baumgartner; Mark Edward Dean; Anna Elman**, all of Austin, TX (US)

(73) **Assignee:** **International Business Machines Corporation**, Armonk, NY (US)

(57) **ABSTRACT**

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

A non-uniform memory access (NUMA) computer system includes at least a local processing node and a remote processing node that are each coupled to a node interconnect. The local processing node includes a local interconnect, a processor and a system memory coupled to the local interconnect, and a node controller interposed between the local interconnect and the node interconnect. In response to receipt of a read request from the local interconnect, the node controller speculatively transmits the read request to the remote processing node via the node interconnect. Thereafter, in response to receipt of a response to the read request from the remote processing node, the node controller handles the response in accordance with a resolution of the read request at the local processing node. For example, in one processing scenario, data contained in the response received from the remote processing node is discarded by the node controller if the read request received a Modified Intervention coherency response at the local processing node.

(21) **Appl. No.:** **09/211,351**

(22) **Filed:** **Dec. 15, 1998**

(51) **Int. Cl.⁷** **G06F 12/00; G06F 13/00**

(52) **U.S. Cl.** **711/141; 711/100; 711/124; 711/147; 711/154**

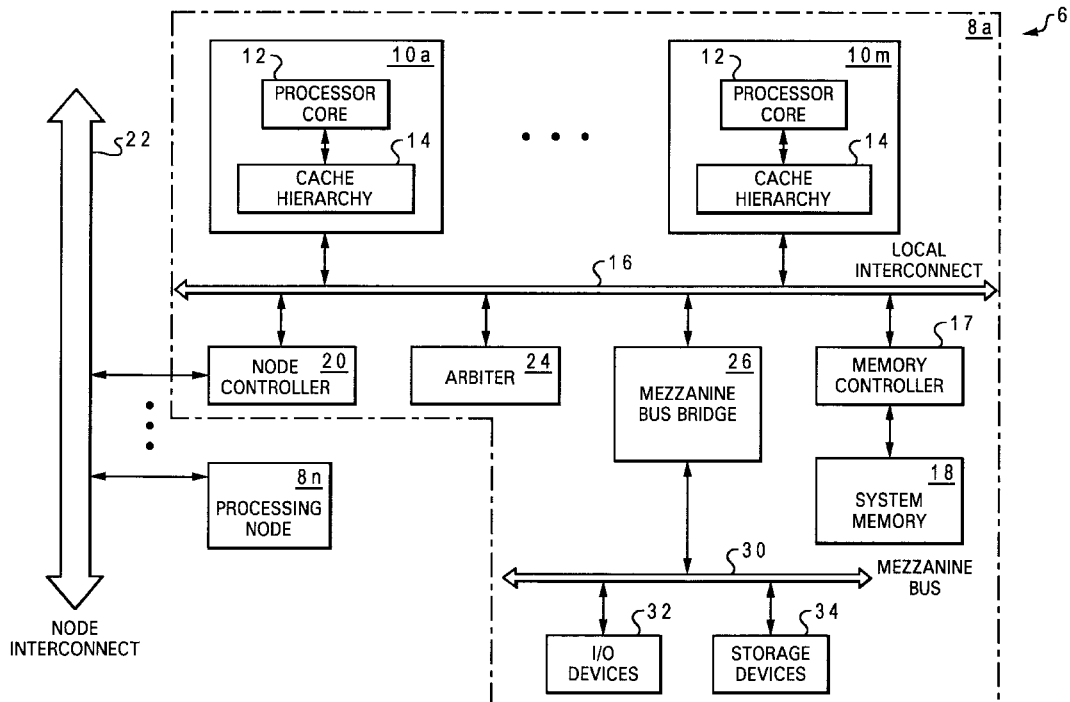
(58) **Field of Search** **711/124, 122, 711/154, 141, 100, 147**

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,754,877 A * 5/1998 Hagersten et al. 712/29
5,892,970 A * 4/1999 Hagersten 710/5
5,950,226 A * 9/1999 Hagersten et al. 711/124
5,958,019 A * 9/1999 Hagersten et al. 709/400

24 Claims, 8 Drawing Sheets



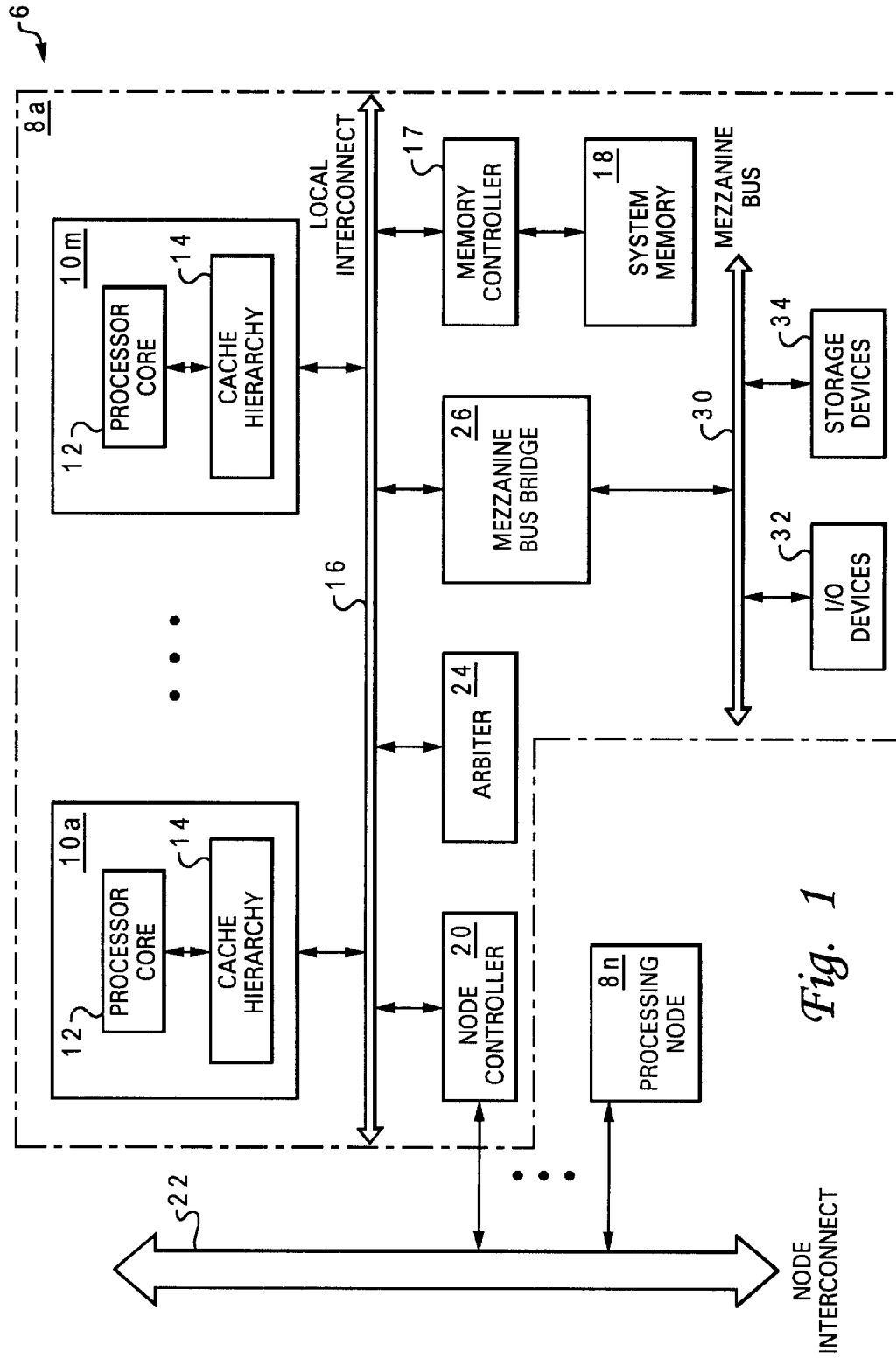


Fig. 1

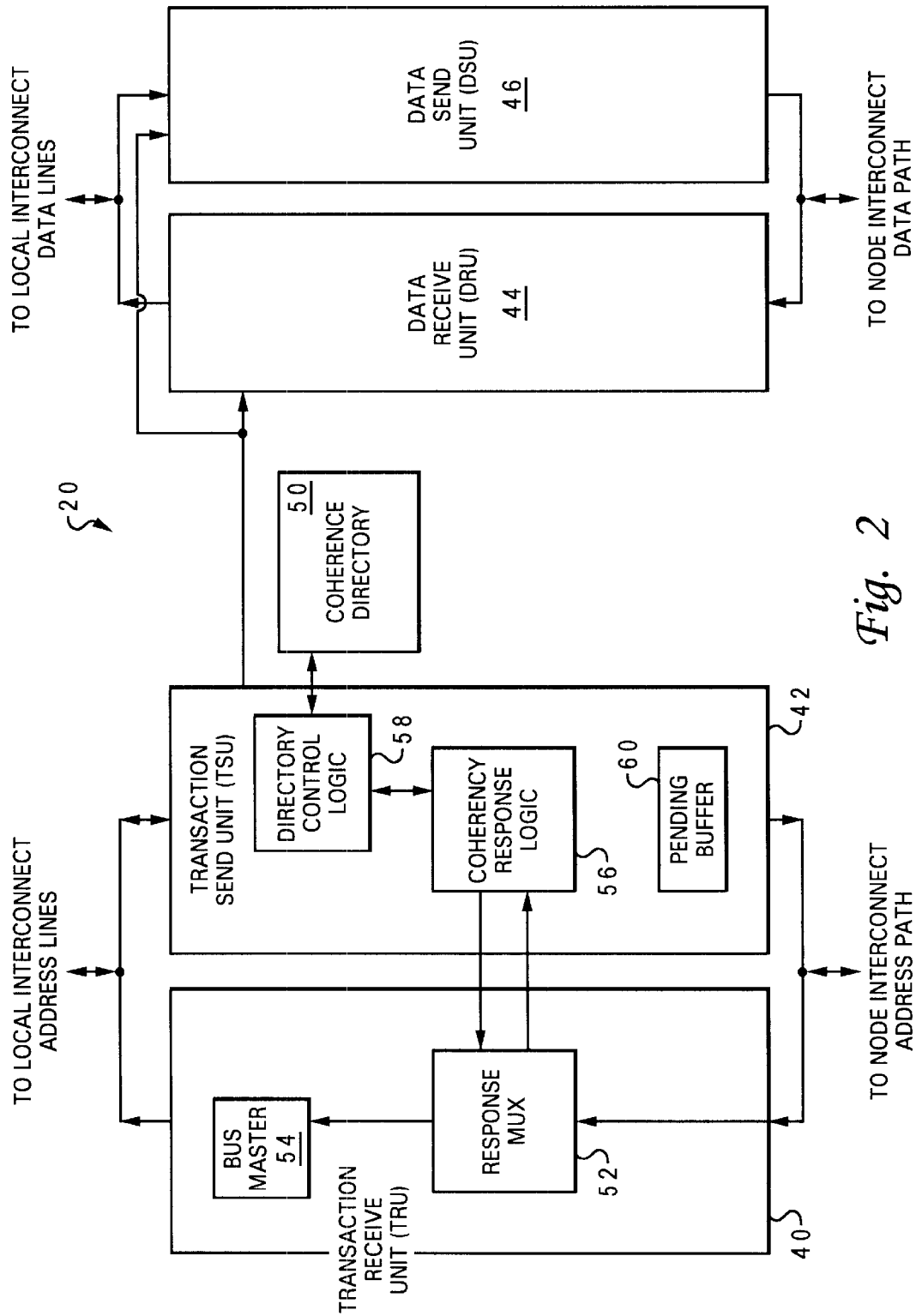
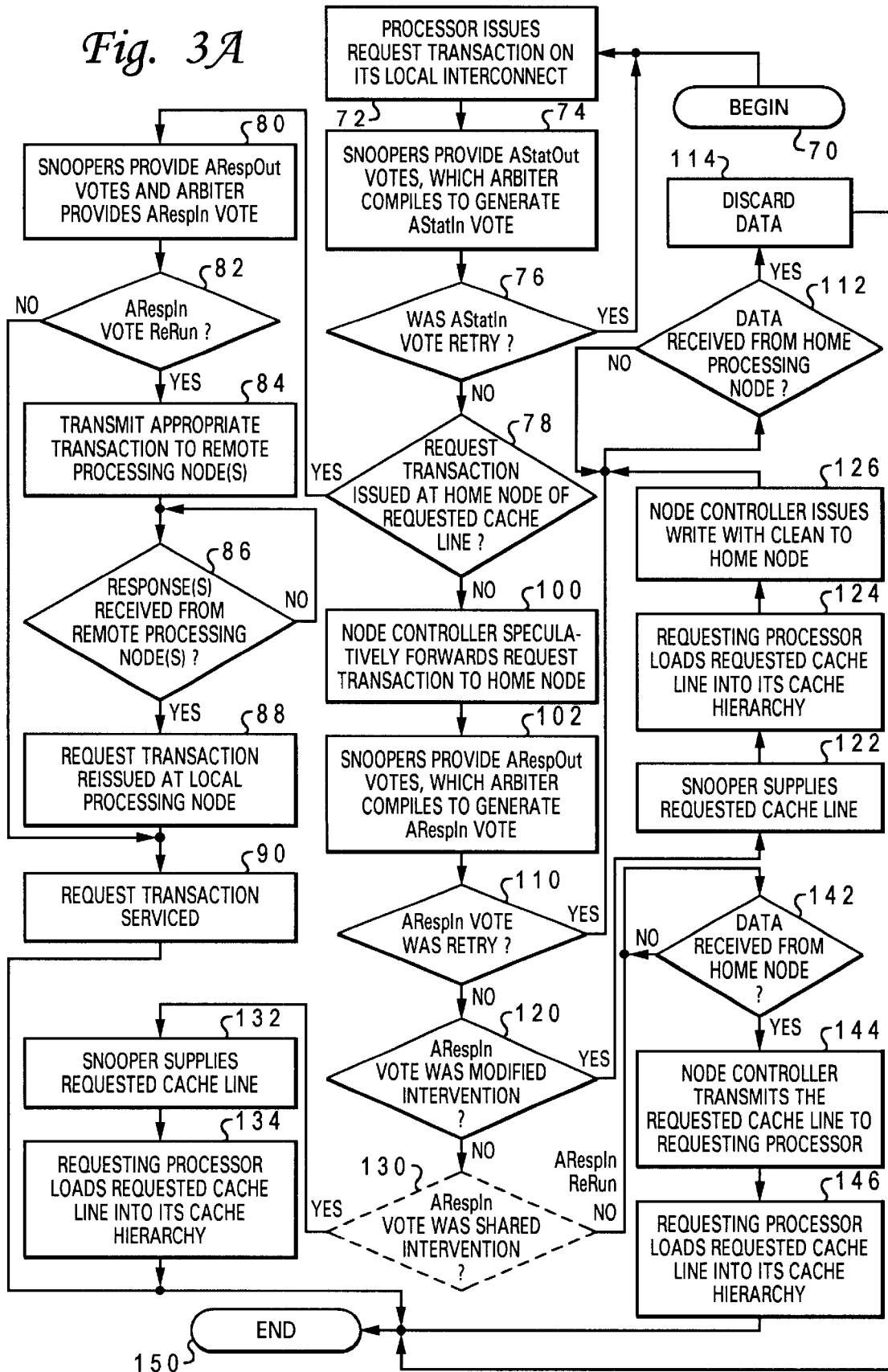


Fig. 2

Fig. 3A



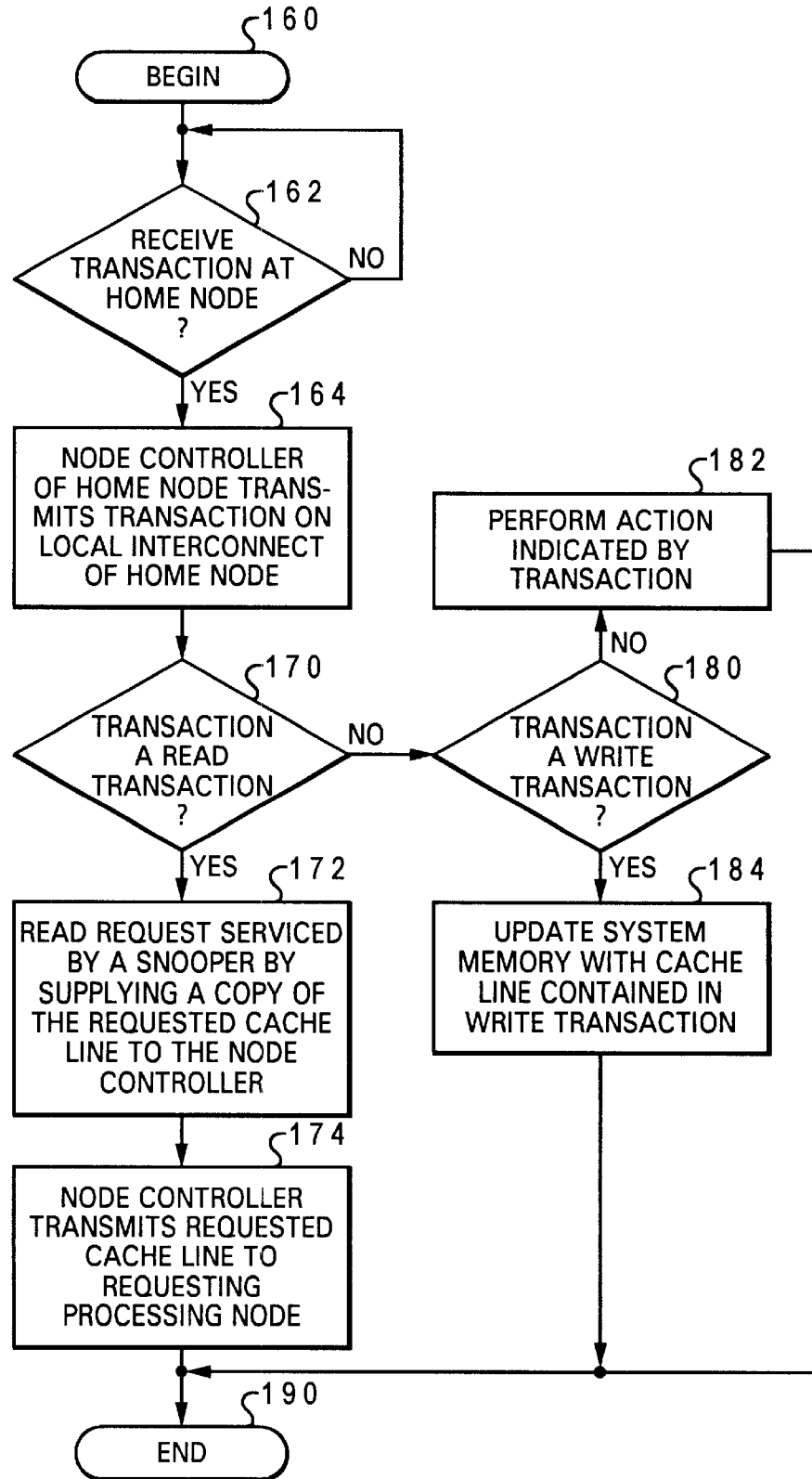


Fig. 3B

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.