

(12) **United States Patent**
Azadegan

(10) **Patent No.:** **US 6,614,845 B1**
 (45) **Date of Patent:** ***Sep. 2, 2003**

(54) **METHOD AND APPARATUS FOR DIFFERENTIAL MACROBLOCK CODING FOR INTRA-FRAME DATA IN VIDEO CONFERENCING SYSTEMS**

(75) Inventor: **Faramarz Azadegan**, San Diego, CA (US)

(73) Assignee: **Verizon Laboratories Inc.**, Waltham, MA (US)

(*) Notice: This patent issued on a continued prosecution application filed under 37 CFR 1.53(d), and is subject to the twenty year patent term provisions of 35 U.S.C. 154(a)(2).

Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 635 days.

(21) Appl. No.: **08/941,785**

(22) Filed: **Sep. 30, 1997**

Related U.S. Application Data

(60) Provisional application No. 60/033,426, filed on Dec. 24, 1996.

(51) **Int. Cl.**⁷ **H04N 7/12**

(52) **U.S. Cl.** **375/240.13**

(58) **Field of Search** 348/384, 390, 348/400, 401, 402, 409, 415, 416, 420, 421; 382/232, 233, 236, 238; 375/240.01, 240.12, 240.13, 240.24; H04N 7/12

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,281,344 A * 7/1981 Mounts 348/401

4,704,628 A	*	11/1987	Chen	348/400
4,930,013 A	*	5/1990	Leaning	348/422
5,226,093 A	*	7/1993	Iwase	348/416.1
5,262,878 A	*	11/1993	Esserman	358/430
5,294,974 A	*	3/1994	Naimpally	348/405
5,386,248 A	*	1/1995	De Haan	348/699
5,684,534 A	*	11/1997	Harney	348/390
5,815,636 A	*	9/1998	Fujii	386/116
5,883,823 A	*	3/1999	Ding	708/402
5,905,535 A	*	5/1999	Kerdranvat	348/416
5,933,571 A	*	8/1999	Bannai	386/112

* cited by examiner

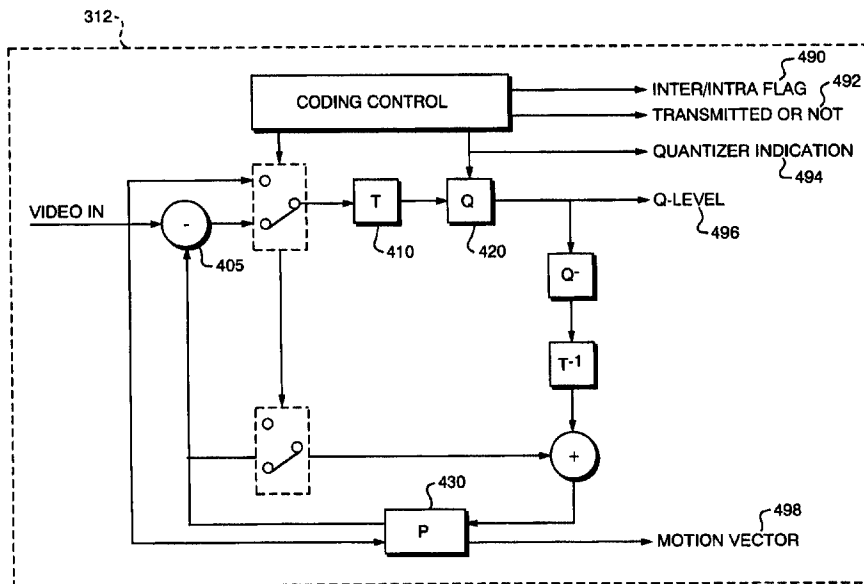
Primary Examiner—Young Lee

(74) *Attorney, Agent, or Firm*—Leonard Charles Suchyta; James K. Weixel

(57) **ABSTRACT**

A process for reducing spatial redundancy and thereby increasing the efficiency of video compression techniques for video conferencing. A process for improving video coding by differential macroblock coding. One video coding process involves differential formation for the coding of each macroblock in comparison to at least one other macroblock within each video picture. Another video coding process involves differential formation for macroblock coding by comparison to two macroblocks, including the macroblock immediately to the left of the coding macroblock and the macroblock immediately above the coding macroblock. These processes involve improvements to the H.263 video coding standard as well as improvements to the H.324 video conferencing standard. These processes also involve improvements to the MPEG-2 and MPEG-4 video standards.

66 Claims, 15 Drawing Sheets



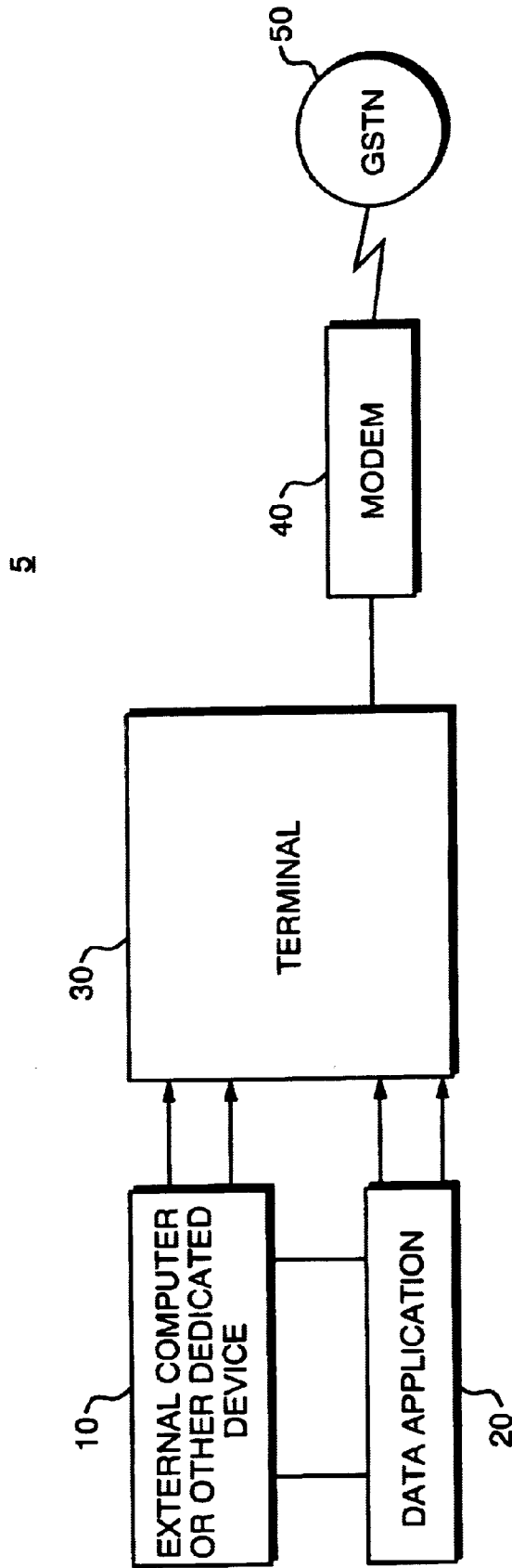


FIG. 1

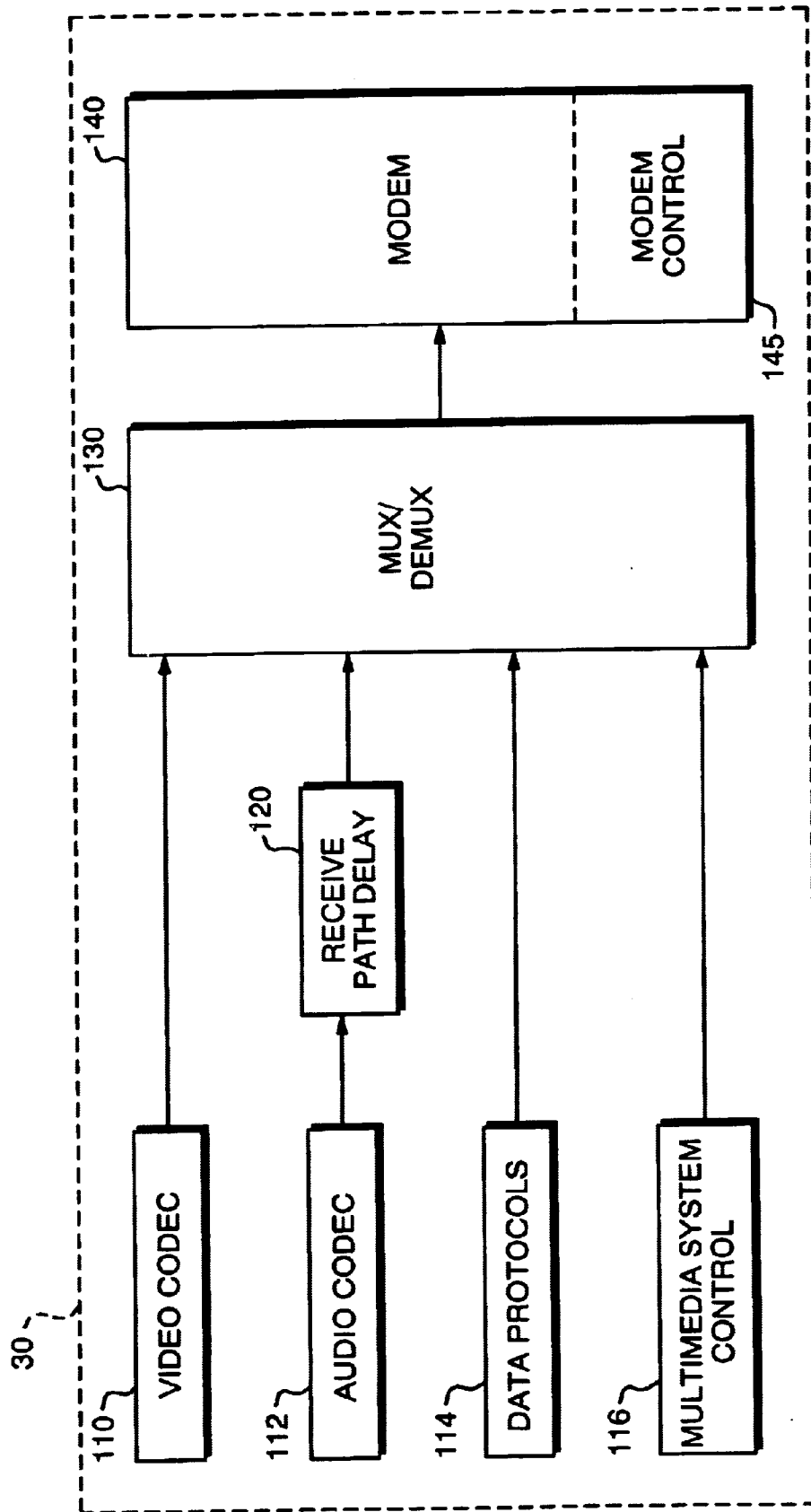


FIG. 2

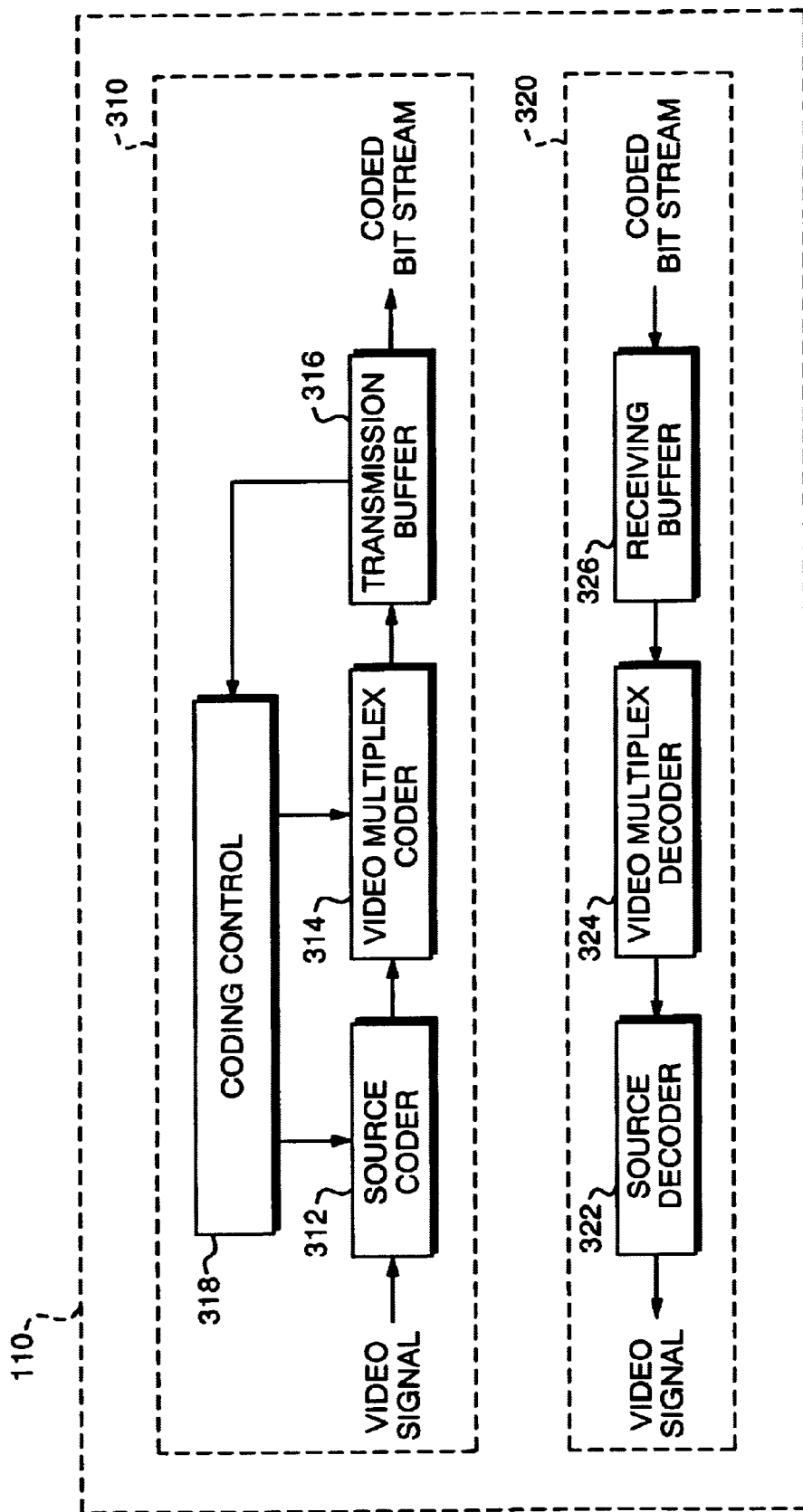


FIG. 3

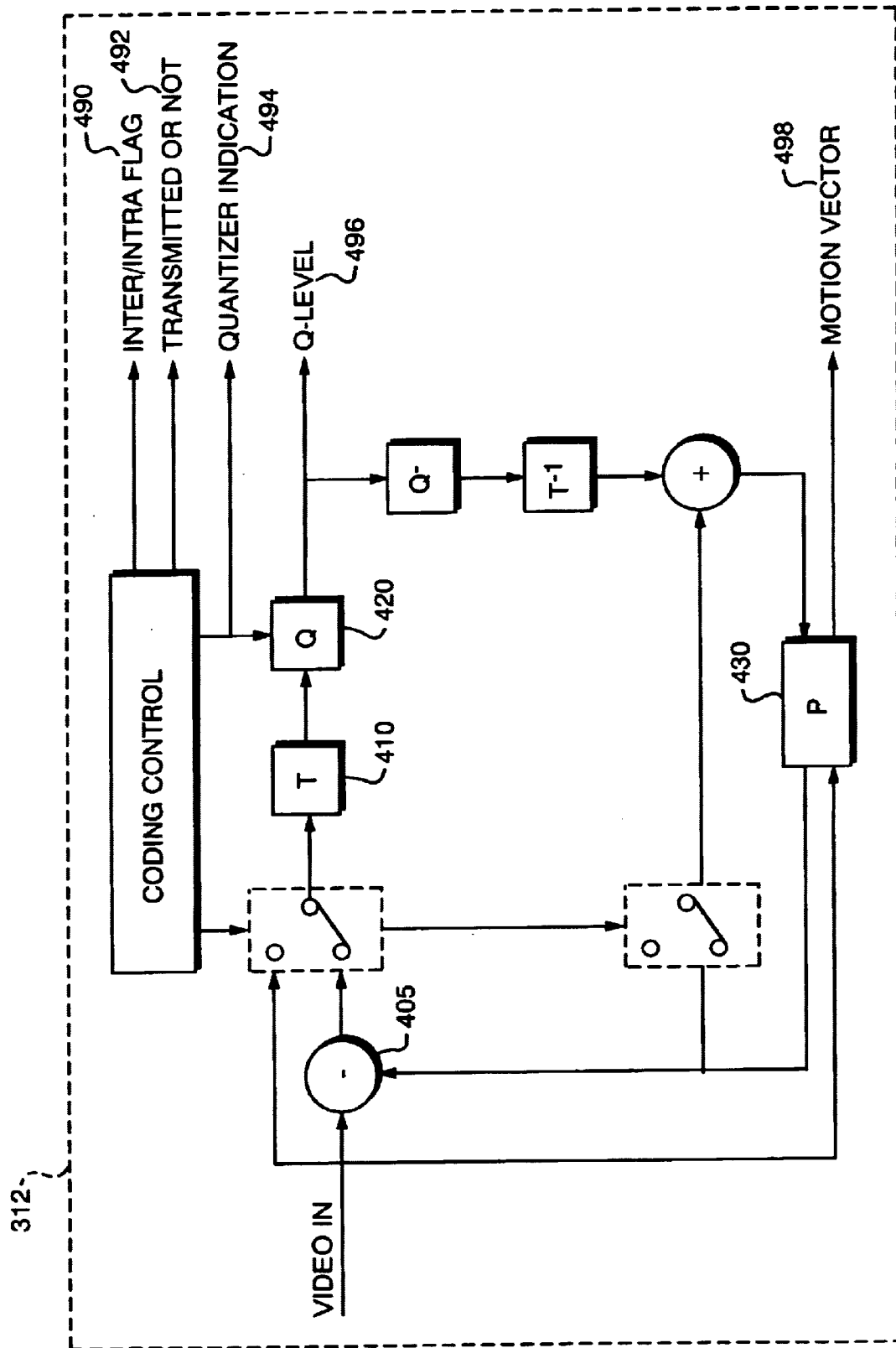


FIG. 4

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.