(12) **United States Patent**   (10) **Patent No.:**   **US 6,426,975 B1**

Nishi et al.   (45) **Date of Patent:**   **Jul. 30, 2002**

(54) **IMAGE PROCESSING METHOD, IMAGE PROCESSING APPARATUS AND DATA RECORDING MEDIUM**

(75) Inventors: **Takahiro Nishi**, Neyagawashi; **Toshiya Takahashi**, Ibarakishi; **Choong Seng Boon**, Moriguchishi; **Shinya Kadono**, Kobeshi, all of (JP)

(73) Assignee: **Matsushita Electric Industrial Co., Ltd.** (JP)

(*) 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.: **09/118,991**

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

(30) **Foreign Application Priority Data**

Jul. 25, 1997	(JP)	 9-200499
Sep. 18, 1997	(JP)	 9-253765
May 22, 1998	(JP)	 10-141919

(51) **Int. Cl.^{7}** **H04B 7/66**
(52) **U.S. Cl.** **375/240.13**
(58) **Field of Search** 375/240.13, 240.01, 375/240.02, 240.15, 240.16, 240.17, 240.2, 240.21, 240.28; 348/405.1, 406.1, 409.1, 416.1, 423, 426, 845, 845.1, 845.3; 382/232, 230; 345/58; 708/402; H04B 7/66

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,510,840 A 4/1996 Yonemitsu et al. 348/402

5,920,353 A * 7/1999 Diaz et al. 348/402
6,002,801 A * 12/1999 Strongin et al. 382/233
6,151,075 A * 11/2000 Shin et al. 348/459
6,233,280 B1 * 5/2001 Kim et al. 375/240.21

* cited by examiner

Primary Examiner—Chris Kelley
Assistant Examiner—Tung Vo
(74) *Attorney, Agent, or Firm*—Parkhurst & Wendel, L.L.P.

(57) **ABSTRACT**

An image processing method for dividing a digital image signal into plural image signals corresponding to plural blocks constituting a single display screen, and performing block-by-block coding of the image signals of the respective blocks, comprises transforming an image signal of a coding target block to be subjected to coding into frequency components by frame-by-frame frequency transformation on a frame basis or field-by-field frequency transformation on a field basis; setting a processing order for coding the frequency components corresponding to the image signal of the coding target block, according as the image signal of the coding target block has been subjected to the frame-by-frame frequency transformation or the field-by-field frequency transformation; and successively coding the frequency components corresponding to the image signal of the coding target block according to the order which has been set. Therefore, in coding of an interlaced image or a specific progressive image in which frame DCT blocks and field DCT blocks coexist, a run length is increased, thereby improving coding efficiency.
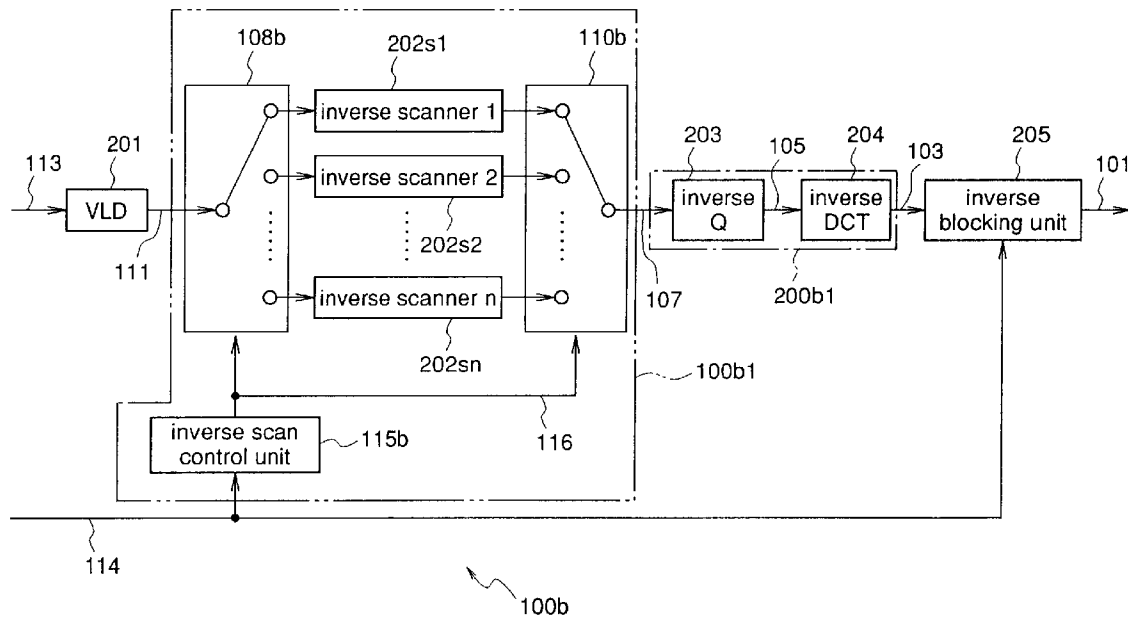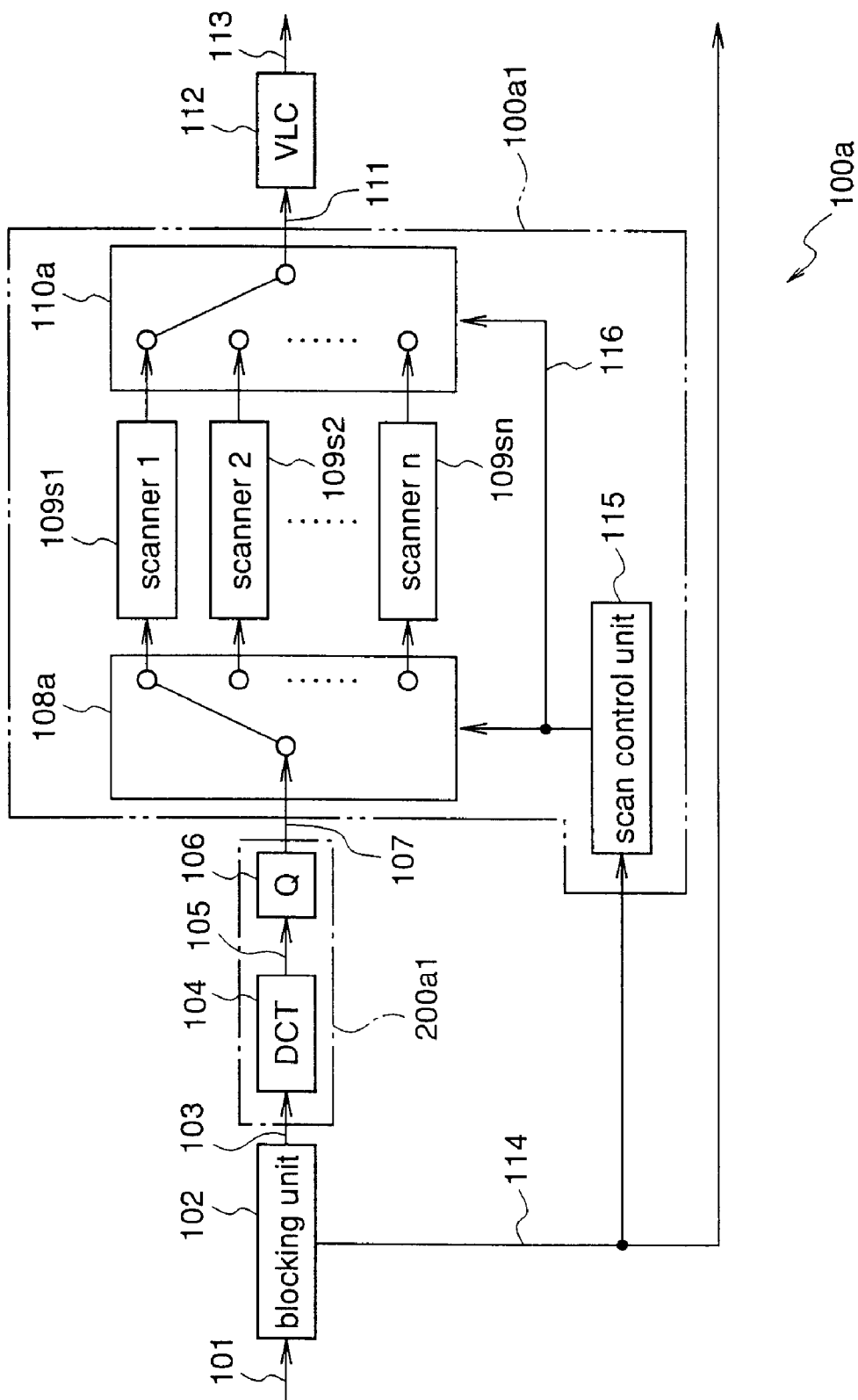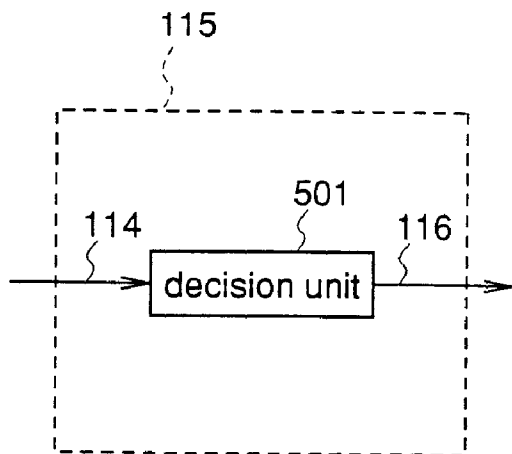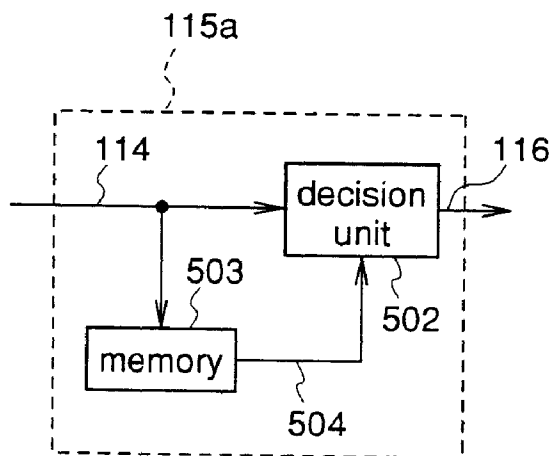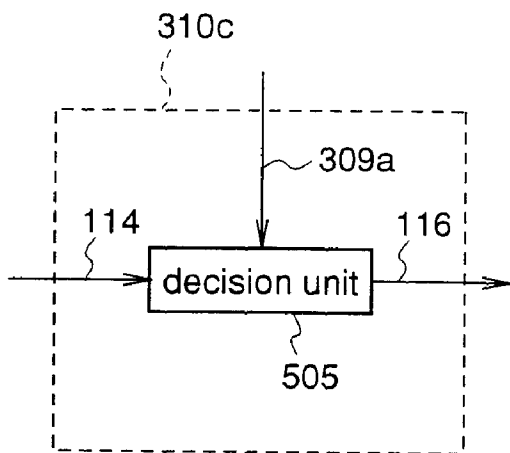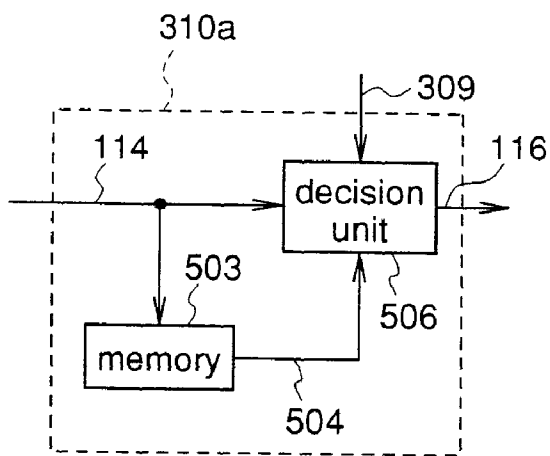
5 Claims, 37 Drawing Sheets

Fig.1

Fig.2 (a)

Fig.2 (b)

Fig.2 (c)

Fig.2 (d)

Fig.3


```
        ( Start )
            |
            v
         /Decide\          601
        / DCT type of \ _____ field _____
        \ coding       /                   |
         \target block/                    |
            |                              |
          frame    602                     |        603
            |                              |
            v                              v
   +------------------+         +------------------+
   | Output signal for|         | Output signal for|
   |selecting scanner 1|        |selecting scanner 2|
   +------------------+         +------------------+
            |                              |
            v                              |
            O <----------------------------+
            |
            v
       ( Completion )
```

Fig.4

Start

701 — Decide DCT type of coding target block

field

703 — Decide DCT type of adjacent block

field — 707 — Output signal for selecting scanner 4

frame — 706 — Output signal for selecting scanner 3

frame

702 — Decide DCT type of adjacent block

field — 705 — Output signal for selecting scanner 2

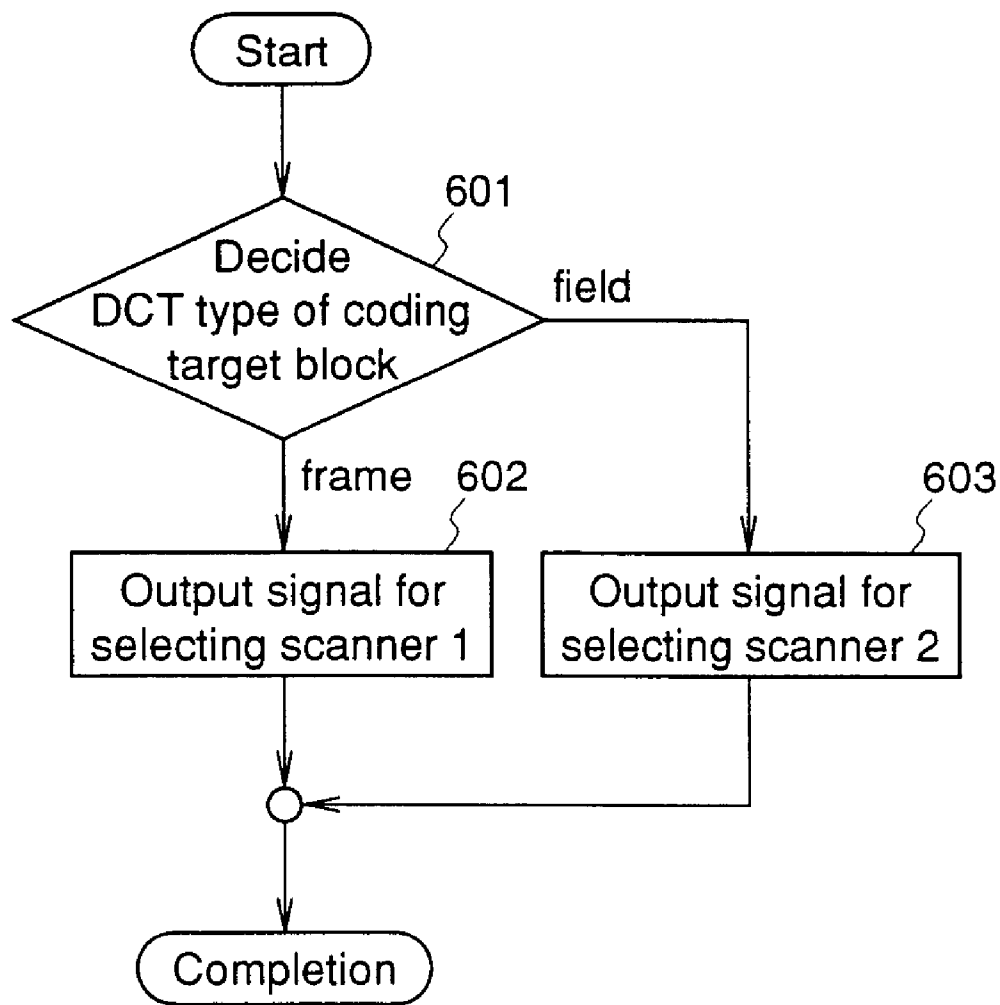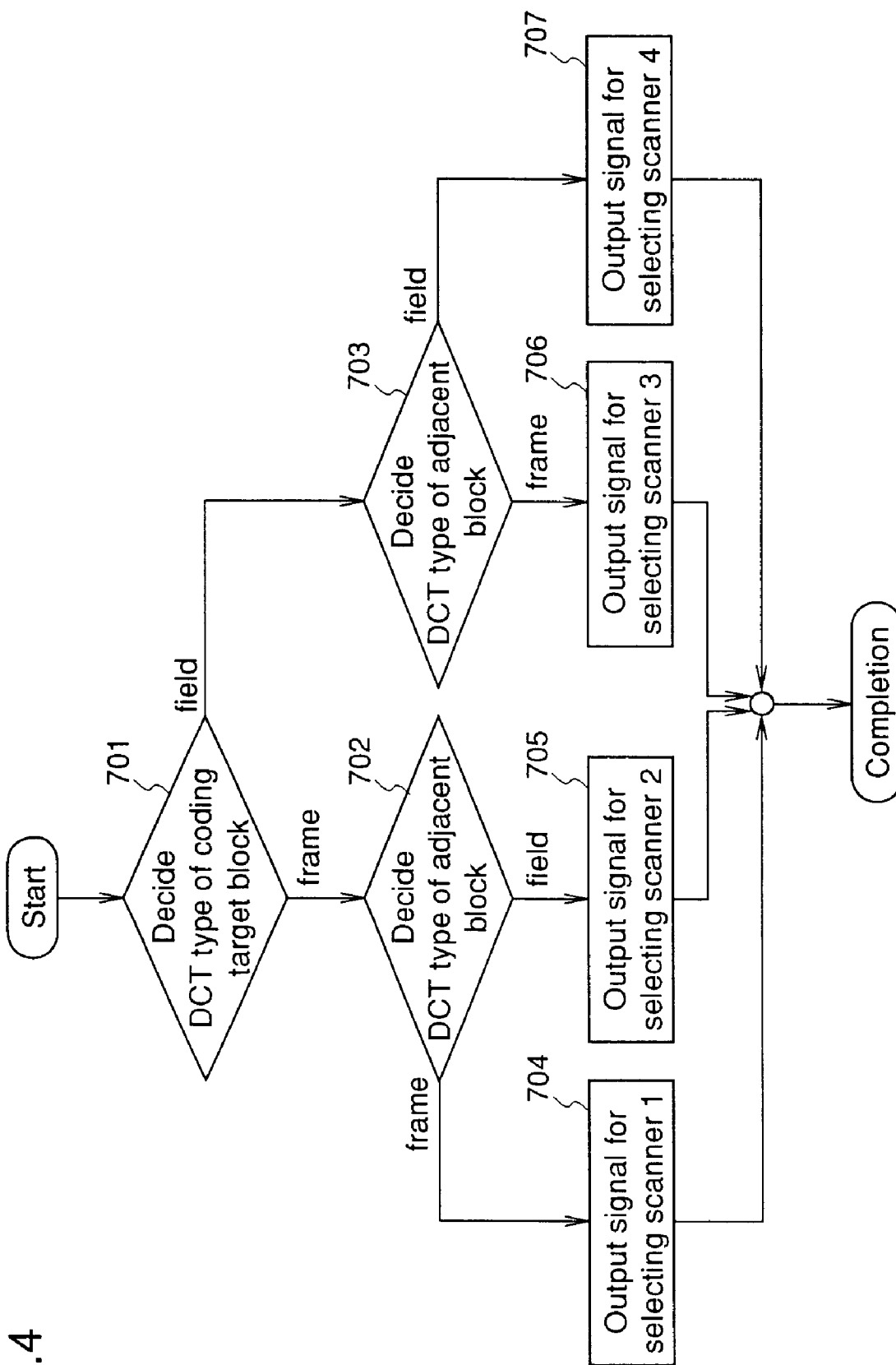frame — 704 — Output signal for selecting scanner 1

Completion

DOCKET ALARM

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.

fastcase
Smarter legal research.