United States Patent [19]

Spriggs et al.

[11] **Patent Number:** 4,791,486

[45] **Date of Patent:** Dec. 13, 1988

[54] **RECURSIVE IMAGE ENCODING/DECODING USING INTERPOLATION WITHIN VARIABLY SUB-DIVIDED PICTURE AREAS**

[75] Inventors: **Hugh Spriggs**, Ipswich; **Charles Nightingale**, Felixstowe; **Roger D. Turkington**, Stowmarket, all of England

[73] Assignee: **British Telecommunications Public Limited Company**, United Kingdom

[21] Appl. No.: **923,827**

[22] PCT Filed: **Feb. 3, 1986**

[86] PCT No.: **PCT/GB86/00060**

§ 371 Date: **Oct. 1, 1986**

§ 102(e) Date: **Oct. 1, 1986**

[87] PCT Pub. No.: **WO86/04757**

PCT Pub. Date: **Aug. 14, 1986**

[30] **Foreign Application Priority Data**

Feb. 5, 1985 [GB] United Kingdom 8502924

[51] Int. Cl.⁴ H04N 7/12
[52] U.S. Cl. 358/138; 358/133
[58] Field of Search 358/138, 133, 141, 11, 358/12, 135, 136, 260, 280, 262

[56] **References Cited**

U.S. PATENT DOCUMENTS

2,921,124	1/1960	Graham	358/138
4,155,097	5/1979	Lux	358/138 X
4,205,341	5/1980	Mitsuya et al.	358/138 X
4,222,076	9/1980	Knowlton	358/133 X
4,232,338	11/1980	Netraval et al.	358/136
4,261,018	4/1981	Knowlton	358/133 X
4,389,672	6/1983	Bowen et al.	358/133 X
4,608,600	8/1986	Sugiyamar	358/133 X
4,654,484	3/1987	Reiffel et al.	358/133 X
4,675,733	6/1987	Tanimoto	358/133 X

OTHER PUBLICATIONS

A. N. Netravali and J. O. Limb, "Picture Coding: A review", Proceedings of the IEEE, vol. 68, No. 3, pp. 366–406, Mar., 1980.

Primary Examiner—Howard W. Britton
Assistant Examiner—Victor R. Kostak
Attorney, Agent, or Firm—Nixon & Vanderhye

[57] **ABSTRACT**

Actual picture points of a picture area are compared with interpolated values derived from selected points. If the differences are small, data for only the selected points are transmitted, otherwise the area is subdivided and each sub-area processed in the same way, so that the number of points selected for transmission is greatest in detailed areas of the image.
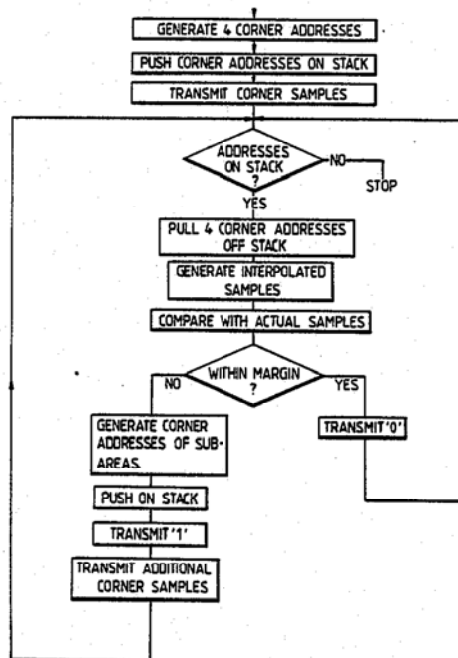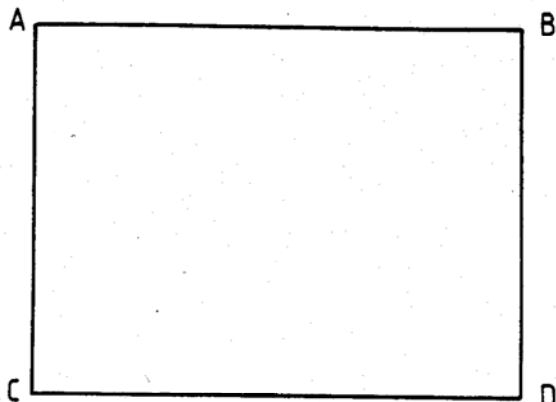
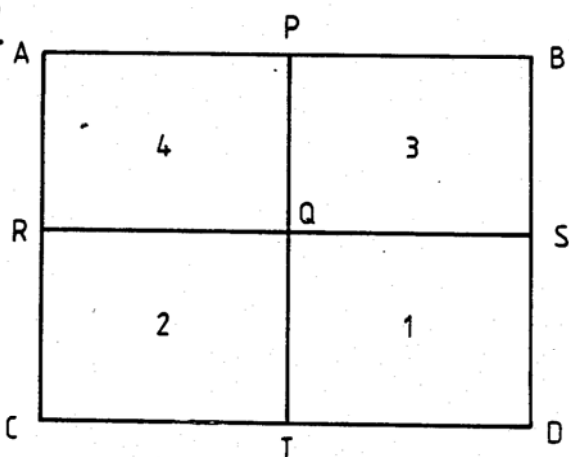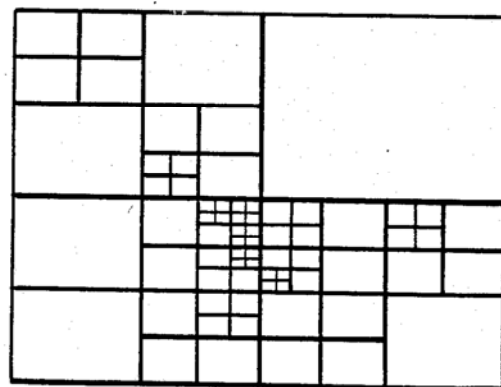**29 Claims, 5 Drawing Sheets**

Fig.1.

Fig.2.

Fig.3.

Fig.4.
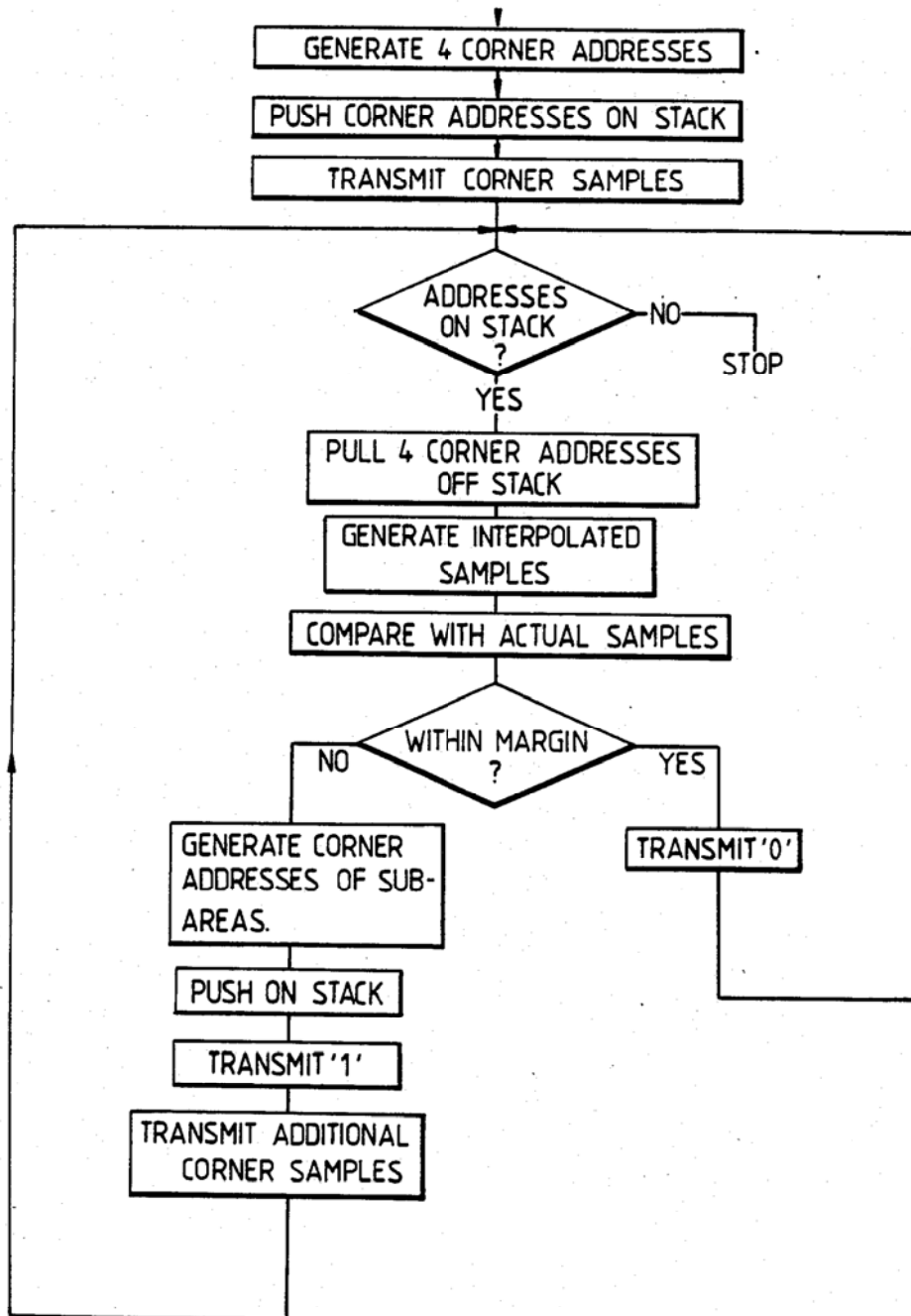
Fig.5.
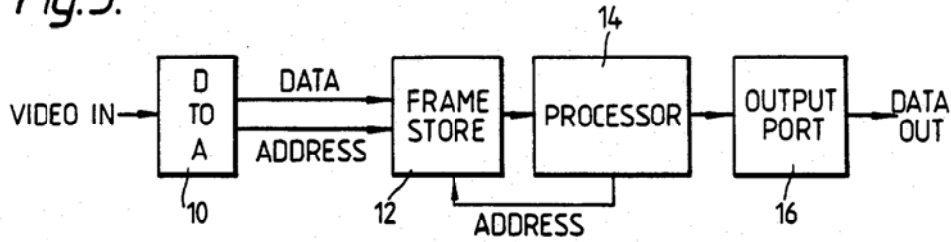
Fig.6.
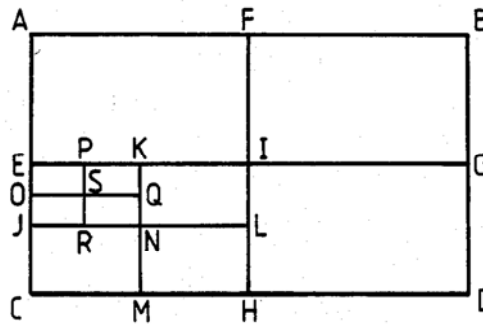
	SA	SB	SC	SD		
1	SE	SF	SG	SH	SI	(ABCD)
0						(AFEI)
0						(FBIG)
1	SJ	SK	SL	SM	SN	(EICH)
1	SO	SO	SQ	SR	SS	(EKJN)
0						(EPOS)
0						(PKSU)
0						(OSJR)
0						(SQRN)
0						(KINL)
0						(JNCM)
0						(NLMH)
0						(IGHD)

Fig.7.

Fig.8.


```
         ┌─────────────────────────────────────┐
         │   GENERATE 4 CORNER  ADDRESSES      │
         ├─────────────────────────────────────┤
         │  PUSH CORNER ADDRESSES  ON  STACK   │
         ├─────────────────────────────────────┤
         │ RECEIVE AND STORE  CORNER  SAMPLES  │
         └─────────────────────────────────────┘

                    ADDRESSES
                    ON STACK        ──NO──
                       ?                     STOP
                      YES

         ┌─────────────────────────────────────┐
         │      PULL ADDRESSES OFF STACK       │
         ├─────────────────────────────────────┤
         │        RECEIVE DIVISION CODE        │
         └─────────────────────────────────────┘

                      CODE
              1     = 0 OR 1      0
                       ?

    ┌──────────────────┐          ┌──────────────────┐
    │ GENERATE CORNER  │          │    INTERPOLATE   │
    │ ADDRESSES  OF    │          ├──────────────────┤
    │ SUB-AREAS        │          │  ENTER  RESULTS  │
    └──────────────────┘          │  IN STORE        │
    ┌──────────────────┐          └──────────────────┘
    │  PUSH ON STACK   │
    └──────────────────┘
    ┌──────────────────┐
    │ RECEIVE AND STORE│
    │ ADDITIONAL       │
    │ CORNER SAMPLES   │
    └──────────────────┘
```

DOCKET ALARM
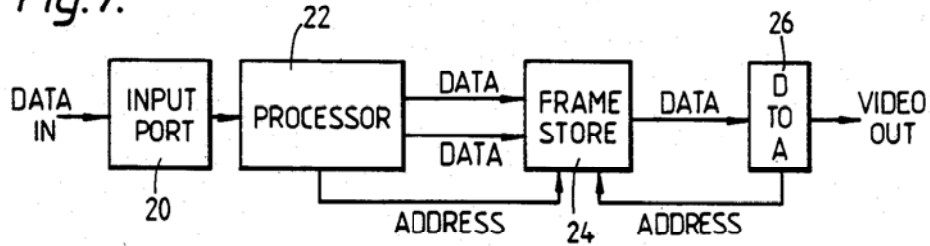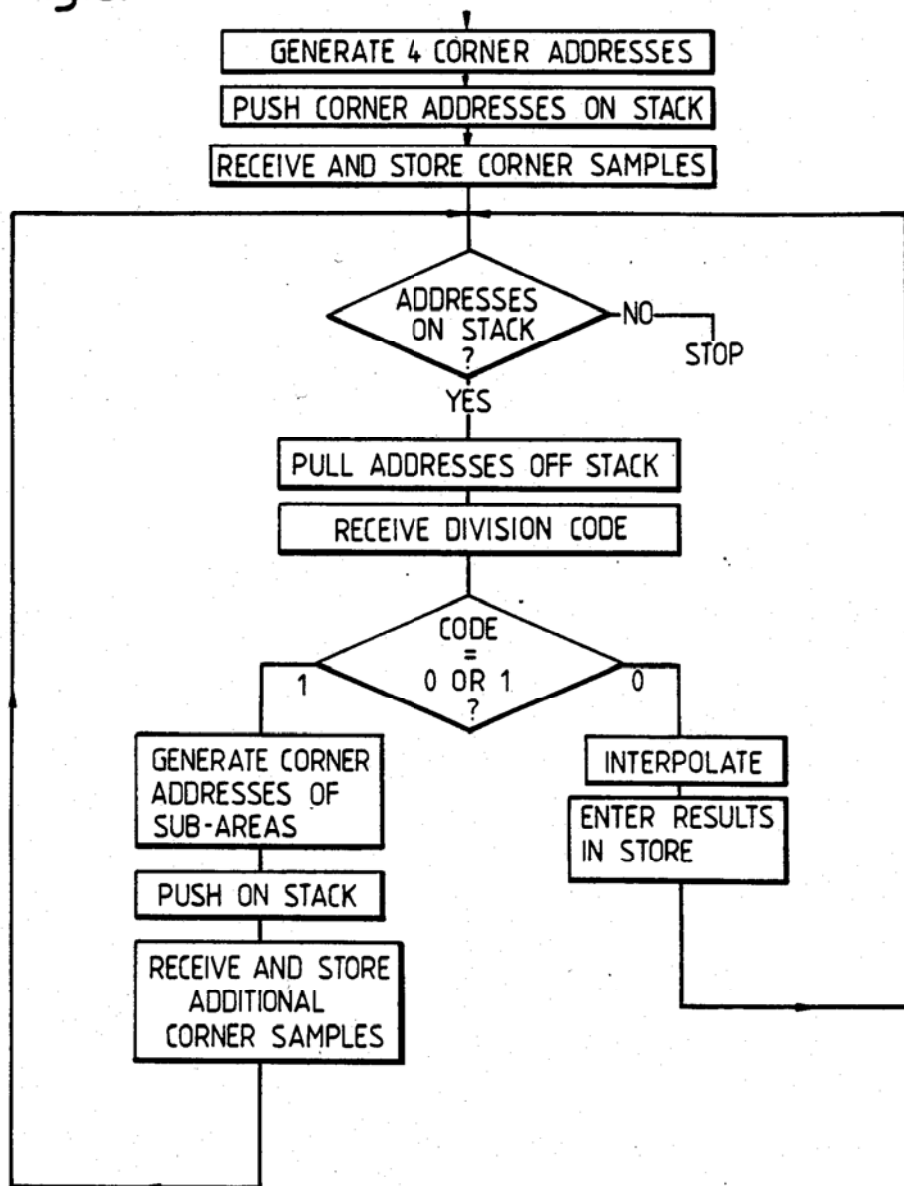
Explore Litigation Insights

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.