US007613383B2

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

(10) **Patent No.: US 7,613,383 B2**
(45) **Date of Patent: Nov. 3, 2009**

(54) **EDITING METHOD AND RECORDING AND REPRODUCING DEVICE**

(75) Inventors: **Susumu Yoshida**, Kawasaki (JP); **Junji Shiokawa**, Chigasaki (JP); **Hiroo Okamoto**, Yokohama (JP)

(73) Assignee: **Hitachi, Ltd.**, Tokyo (JP)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 817 days.

(21) Appl. No.: **11/203,457**

(22) Filed: **Aug. 11, 2005**

(65) **Prior Publication Data**

US 2006/0171674 A1 Aug. 3, 2006

(30) **Foreign Application Priority Data**

Dec. 2, 2004 (JP) 2004-349264
Dec. 28, 2004 (JP) 2004-378767
Dec. 28, 2004 (JP) 2004-378768

(51) **Int. Cl.**
H04N 5/00 (2006.01)
H04N 7/00 (2006.01)

(52) **U.S. Cl.** **386/125**; 386/95; 386/126

(58) **Field of Classification Search** 386/95, 386/125–126

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

6,181,870 B1 * 1/2001 Okada et al. 386/95
2003/0063897 A1 4/2003 Heo

FOREIGN PATENT DOCUMENTS

CN 1243596 A 2/2000
JP 11-32301 A 2/1999
JP 2000-152180 5/2000
JP 2002-150503 A 5/2002
JP 2003-36652 A 2/2003
JP 2003-100055 A 4/2003
JP 2004-192779 A 7/2004

OTHER PUBLICATIONS

Japan Patent Office (JPO) office action for JPO patent application JP2004-349264 (Aug. 6, 2008).
China Intellectual Property Office (SIPO) office action for SIPO patent application CN2005-100935522 (May 26, 2008).
Japan Patent Office (JPO) office action for JPO patent application JP2008-268104 (Jun. 12, 2009).

* cited by examiner

Primary Examiner—Thai Tran
Assistant Examiner—Daquan Zhao
(74) *Attorney, Agent, or Firm*—Townsend and Townsend and Crew LLP

(57) **ABSTRACT**

In order to provide a recording and reproducing device that allows a user to select and manage arbitrary play lists, a unit of management for managing all registered play list information and an upper management hierarchical level are added. The unit of management is adapted to be handled on the same level with unified information that indicates a reproduction range of all AV data. User-defined unified information is adapted to be handled on the added management hierarchical level. The user-defined unified information is formed to allow arbitrary reproduction ranges contained on a lower hierarchical level to be registered.

4 Claims, 9 Drawing Sheets

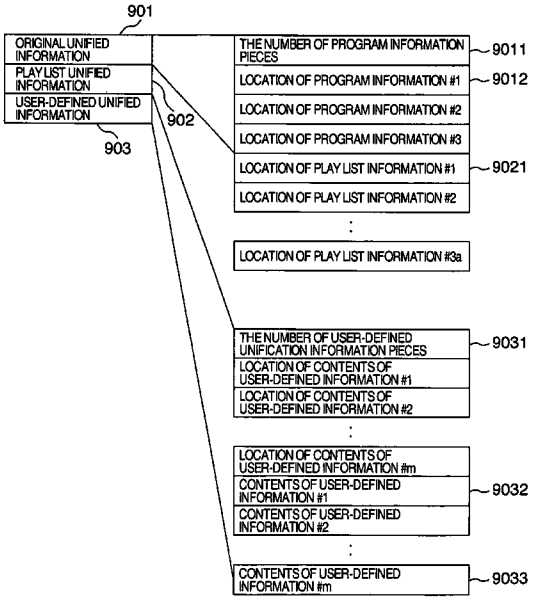


FIG.1

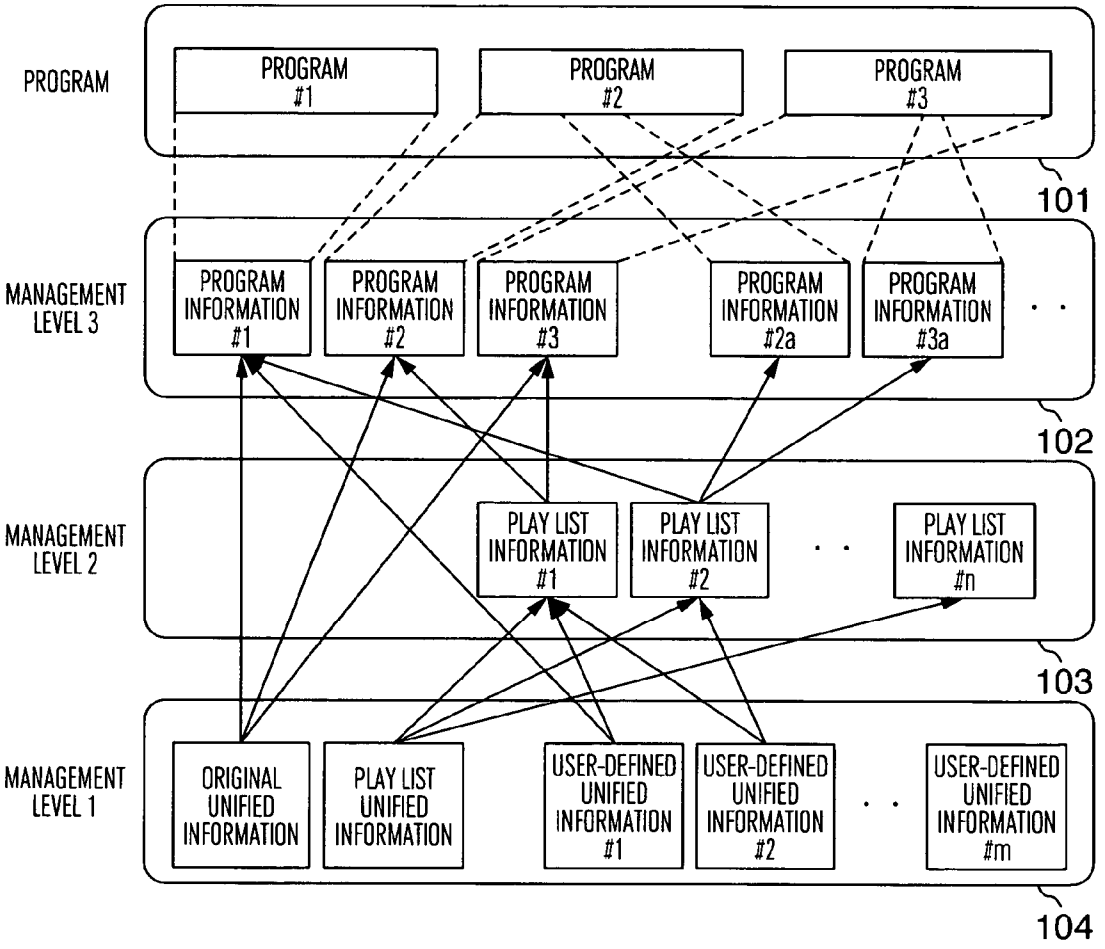

PROGRAM
PROGRAM #1
PROGRAM #2
PROGRAM #3
101
MANAGEMENT LEVEL 3
PROGRAM INFORMATION #1
PROGRAM INFORMATION #2
PROGRAM INFORMATION #3
PROGRAM INFORMATION #2a
PROGRAM INFORMATION #3a
102
MANAGEMENT LEVEL 2
PLAY LIST INFORMATION #1
PLAY LIST INFORMATION #2
PLAY LIST INFORMATION #n
103
MANAGEMENT LEVEL 1
ORIGINAL UNIFIED INFORMATION
PLAY LIST UNIFIED INFORMATION
USER-DEFINED UNIFIED INFORMATION #1
USER-DEFINED UNIFIED INFORMATION #2
USER-DEFINED UNIFIED INFORMATION #m
104

FIG.2
PRIOR ART

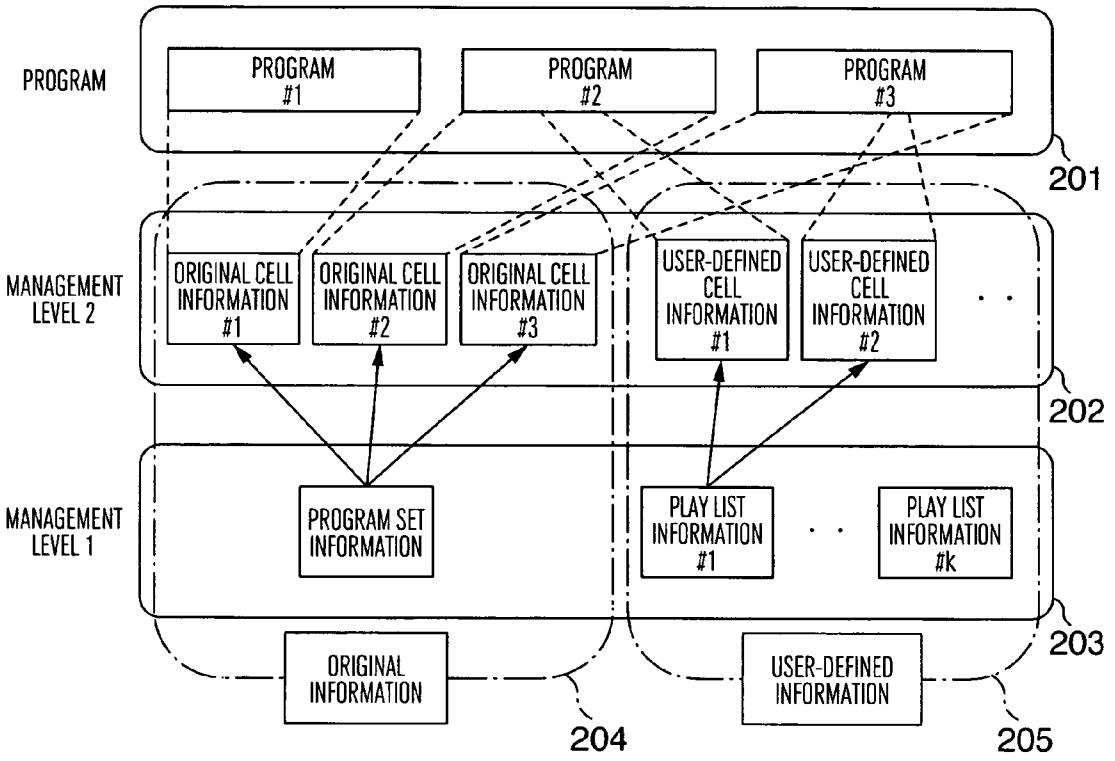


FIG.3

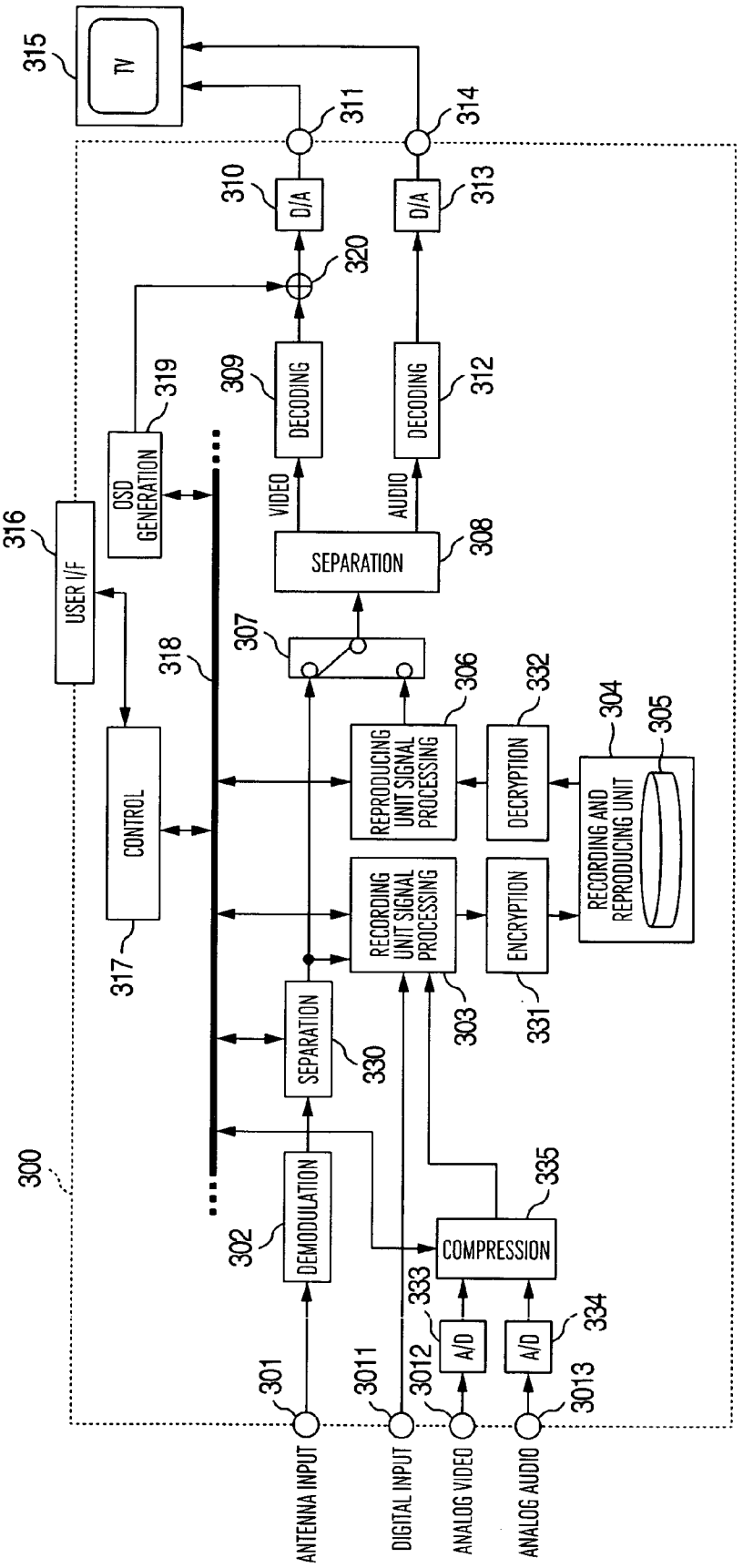

TV
315
311
314
310
D/A
D/A
313
320
309
DECODING
DECODING
312
319
OSD GENERATION
VIDEO
AUDIO
316
USER I/F
SEPARATION
308
307
318
306
332
304
305
REPRODUCING UNIT SIGNAL PROCESSING
DECRYPTION
RECORDING AND REPRODUCING UNIT
CONTROL
RECORDING UNIT SIGNAL PROCESSING
ENCRYPTION
317
SEPARATION
330
303
331
300
335
DEMODULATION
302
COMPRESSION
333
A/D
A/D
334
301
3011
3012
3013
ANTENNA INPUT
DIGITAL INPUT
ANALOG VIDEO
ANALOG AUDIO

FIG.4

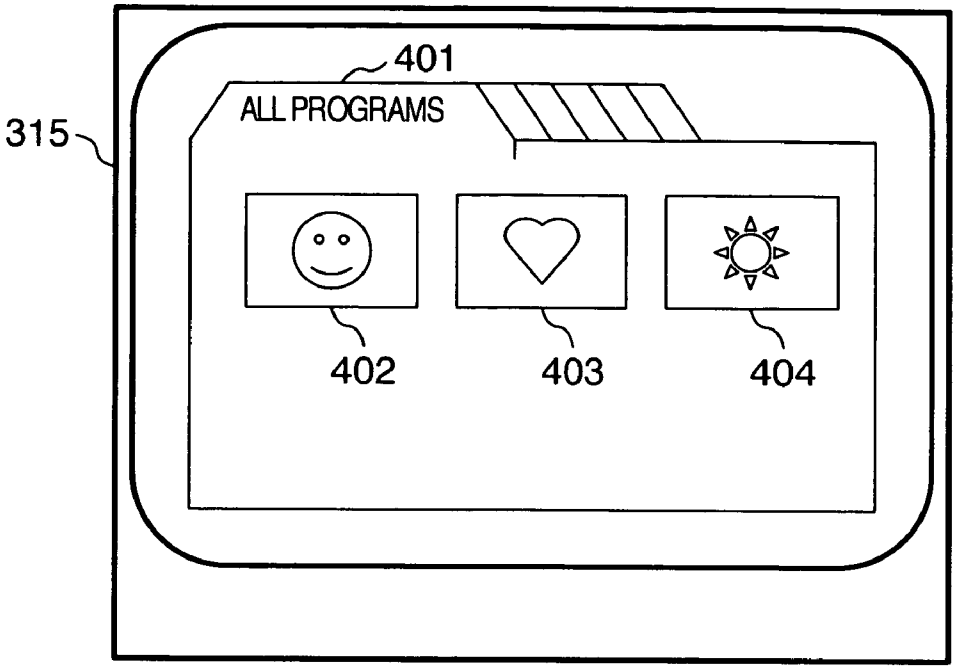

401
ALL PROGRAMS
315
402
403
404

FIG.5

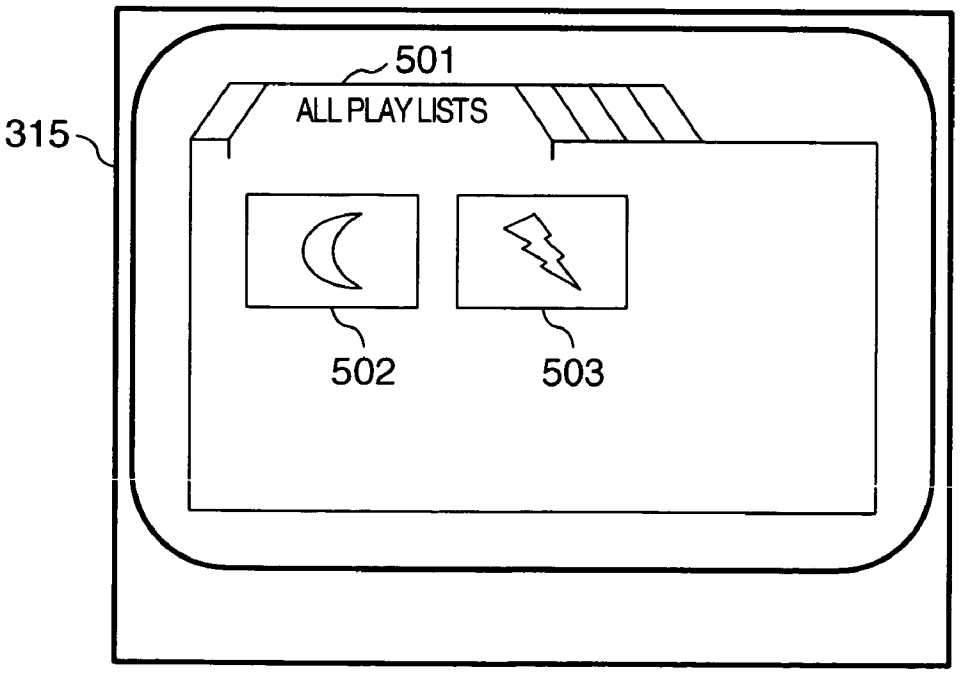

501
ALL PLAY LISTS
315
502
503

FIG.6

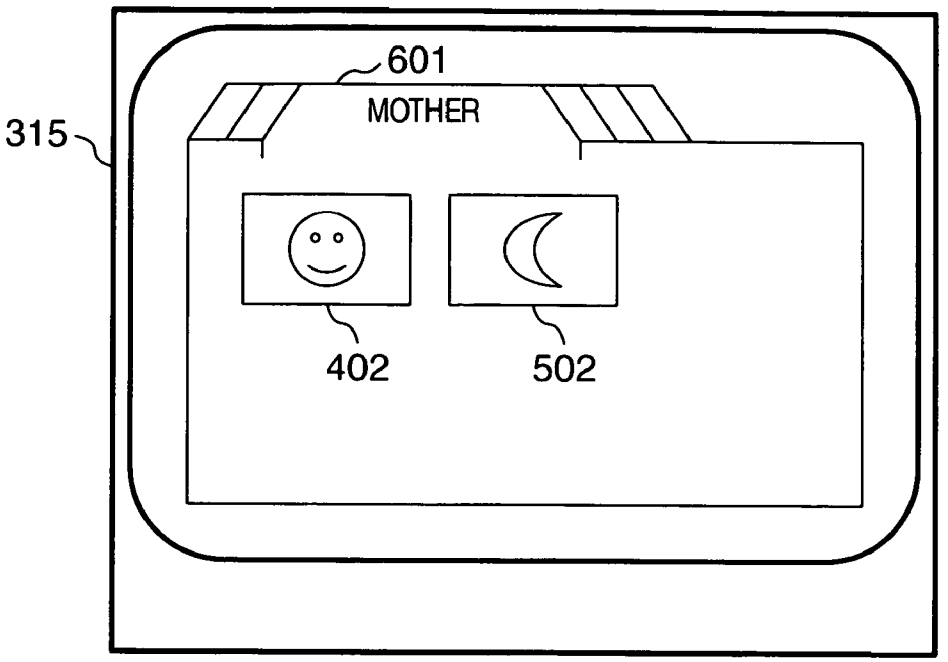


FIG.7

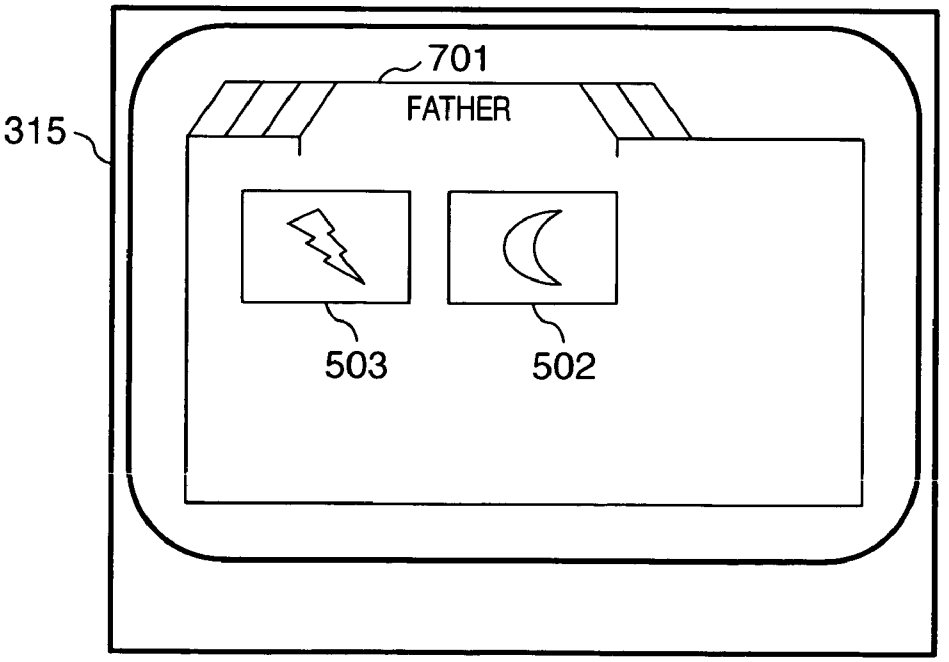


FIG.8

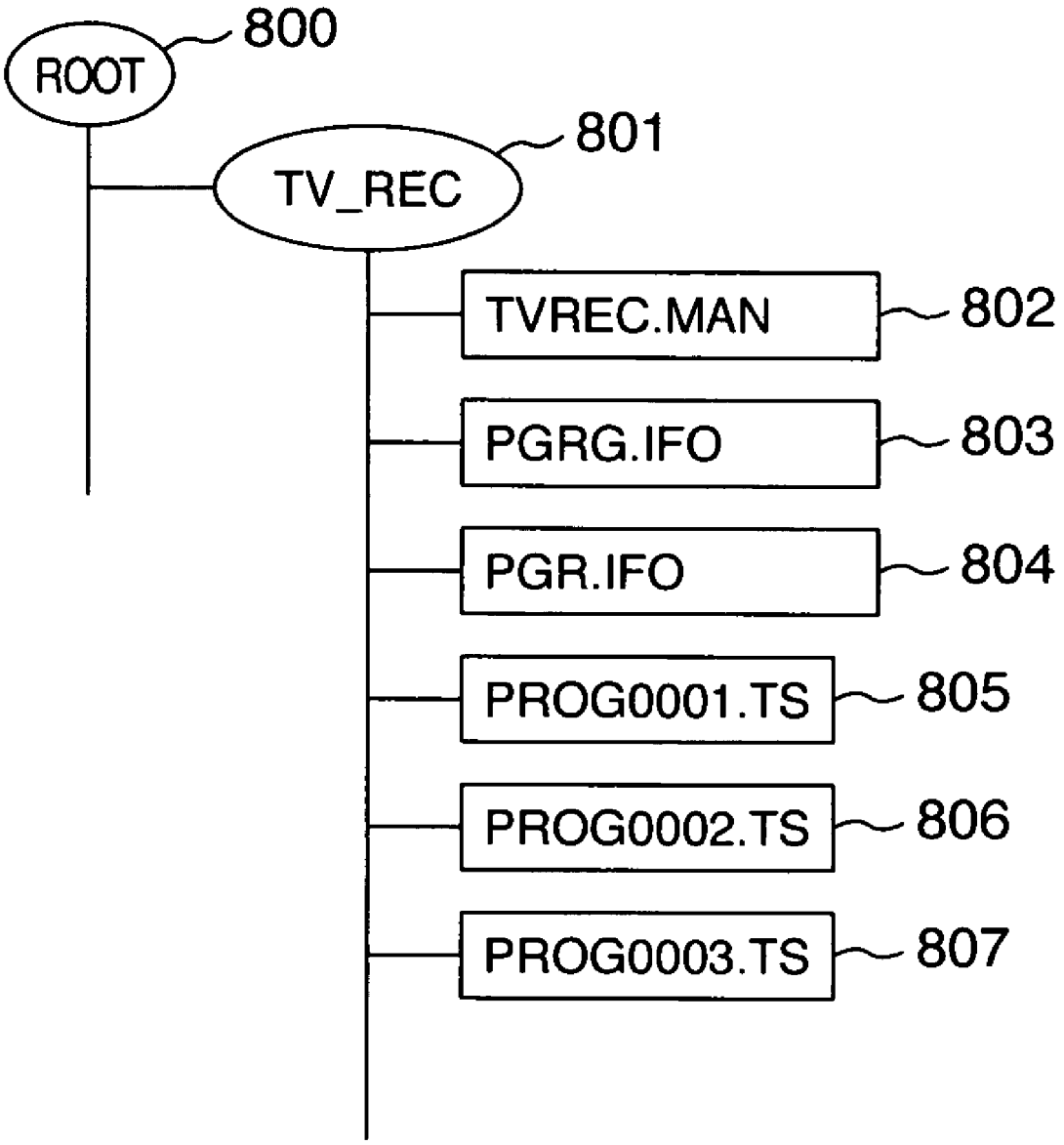

ROOT
800
TV_REC
801
TVREC.MAN
802
PGRG.IFO
803
PGR.IFO
804
PROG0001.TS
805
PROG0002.TS
806
PROG0003.TS
807

FIG.9

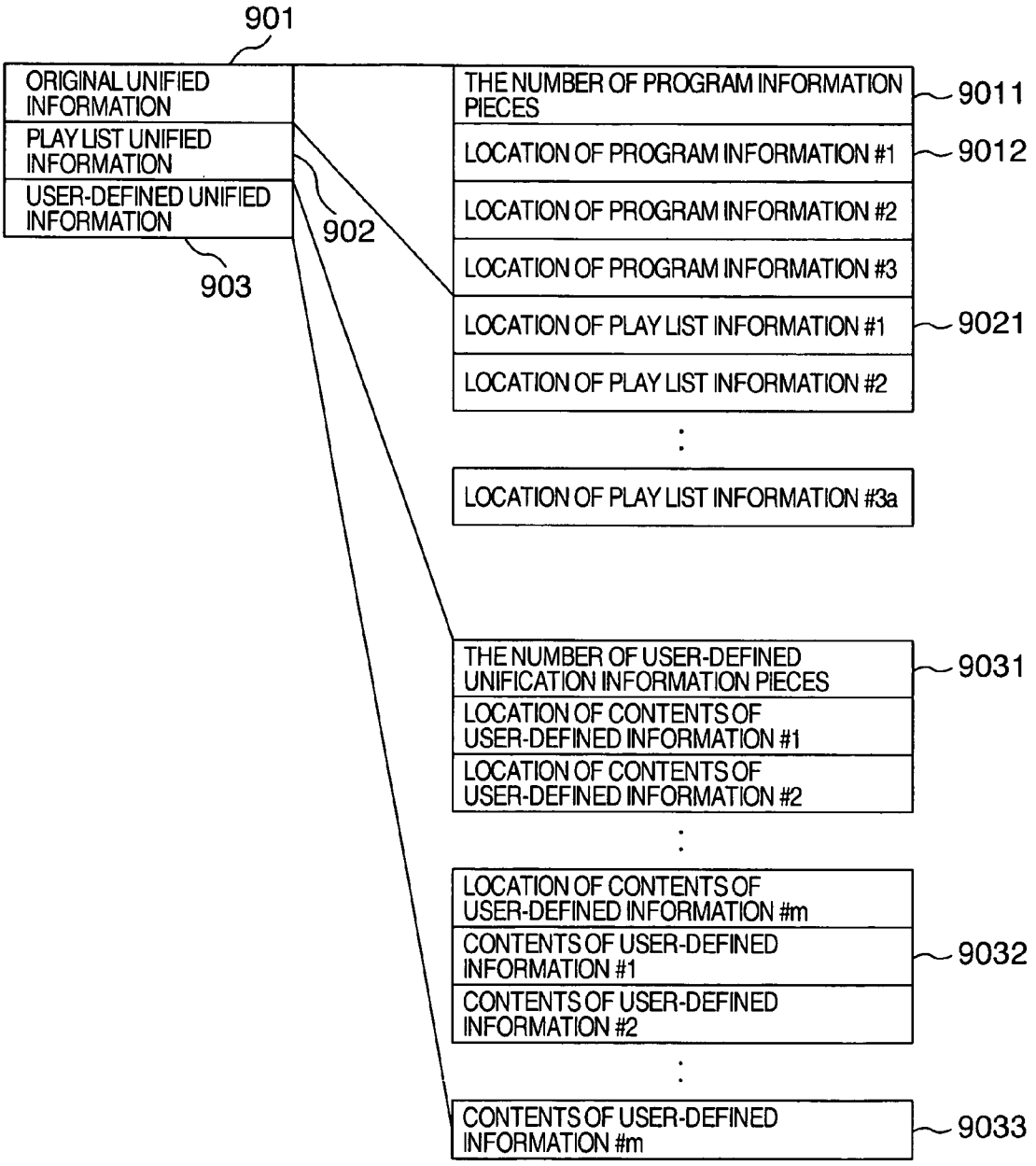

901
ORIGINAL UNIFIED INFORMATION
PLAY LIST UNIFIED INFORMATION
USER-DEFINED UNIFIED INFORMATION
902
903
THE NUMBER OF PROGRAM INFORMATION PIECES
9011
LOCATION OF PROGRAM INFORMATION #1
9012
LOCATION OF PROGRAM INFORMATION #2
LOCATION OF PROGRAM INFORMATION #3
LOCATION OF PLAY LIST INFORMATION #1
9021
LOCATION OF PLAY LIST INFORMATION #2
LOCATION OF PLAY LIST INFORMATION #3a
THE NUMBER OF USER-DEFINED UNIFICATION INFORMATION PIECES
9031
LOCATION OF CONTENTS OF USER-DEFINED INFORMATION #1
LOCATION OF CONTENTS OF USER-DEFINED INFORMATION #2
LOCATION OF CONTENTS OF USER-DEFINED INFORMATION #m
CONTENTS OF USER-DEFINED INFORMATION #1
9032
CONTENTS OF USER-DEFINED INFORMATION #2
CONTENTS OF USER-DEFINED INFORMATION #m
9033

FIG.10

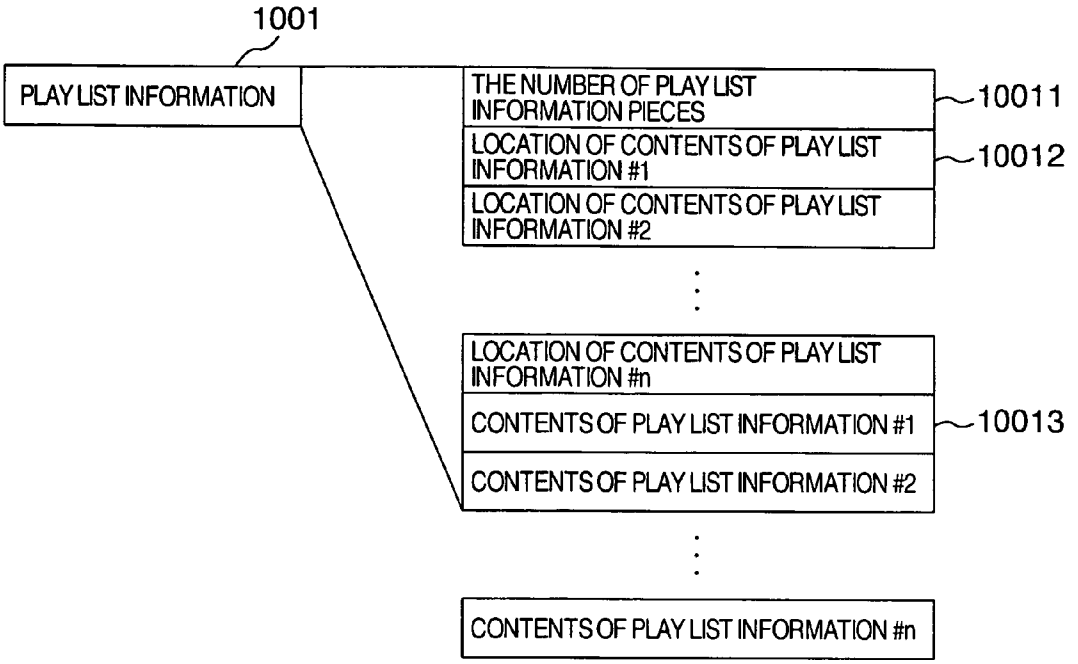

1001
PLAY LIST INFORMATION
THE NUMBER OF PLAY LIST INFORMATION PIECES
10011
LOCATION OF CONTENTS OF PLAY LIST INFORMATION #1
10012
LOCATION OF CONTENTS OF PLAY LIST INFORMATION #2
LOCATION OF CONTENTS OF PLAY LIST INFORMATION #n
CONTENTS OF PLAY LIST INFORMATION #1
10013
CONTENTS OF PLAY LIST INFORMATION #2
CONTENTS OF PLAY LIST INFORMATION #n

FIG.11

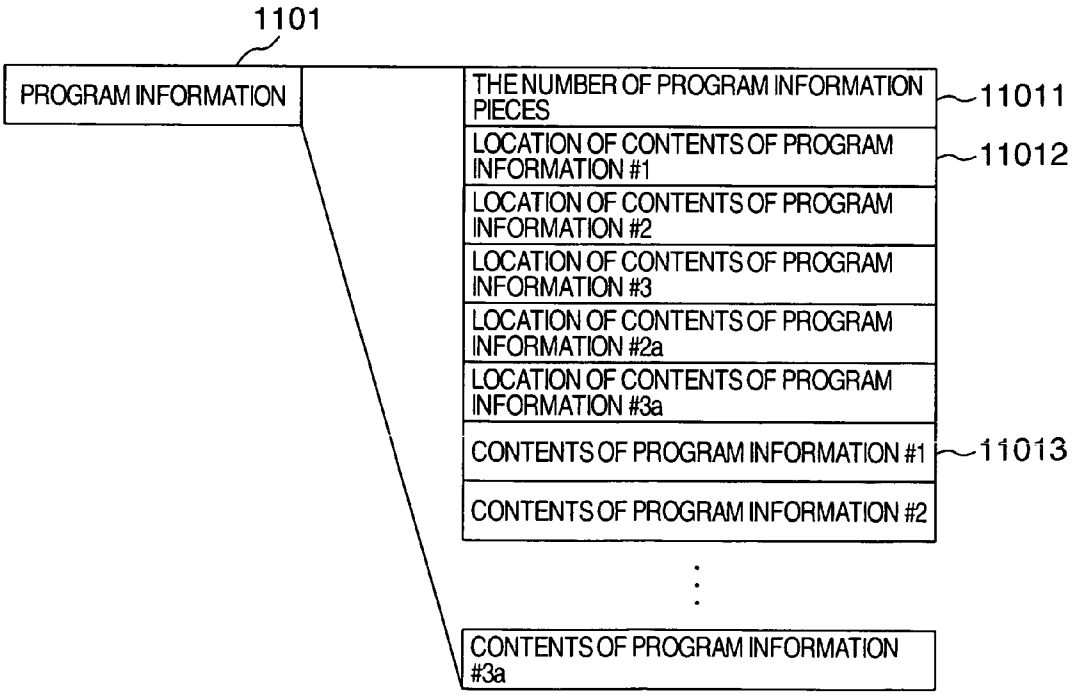

1101
PROGRAM INFORMATION
THE NUMBER OF PROGRAM INFORMATION PIECES
11011
LOCATION OF CONTENTS OF PROGRAM INFORMATION #1
11012
LOCATION OF CONTENTS OF PROGRAM INFORMATION #2
LOCATION OF CONTENTS OF PROGRAM INFORMATION #3
LOCATION OF CONTENTS OF PROGRAM INFORMATION #2a
LOCATION OF CONTENTS OF PROGRAM INFORMATION #3a
CONTENTS OF PROGRAM INFORMATION #1
11013
CONTENTS OF PROGRAM INFORMATION #2
CONTENTS OF PROGRAM INFORMATION #3a

FIG.12

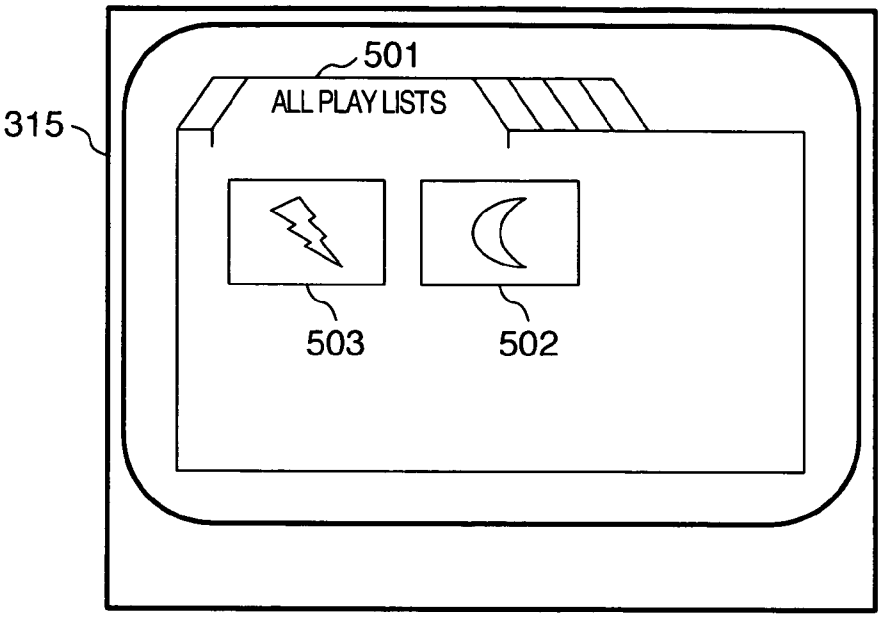
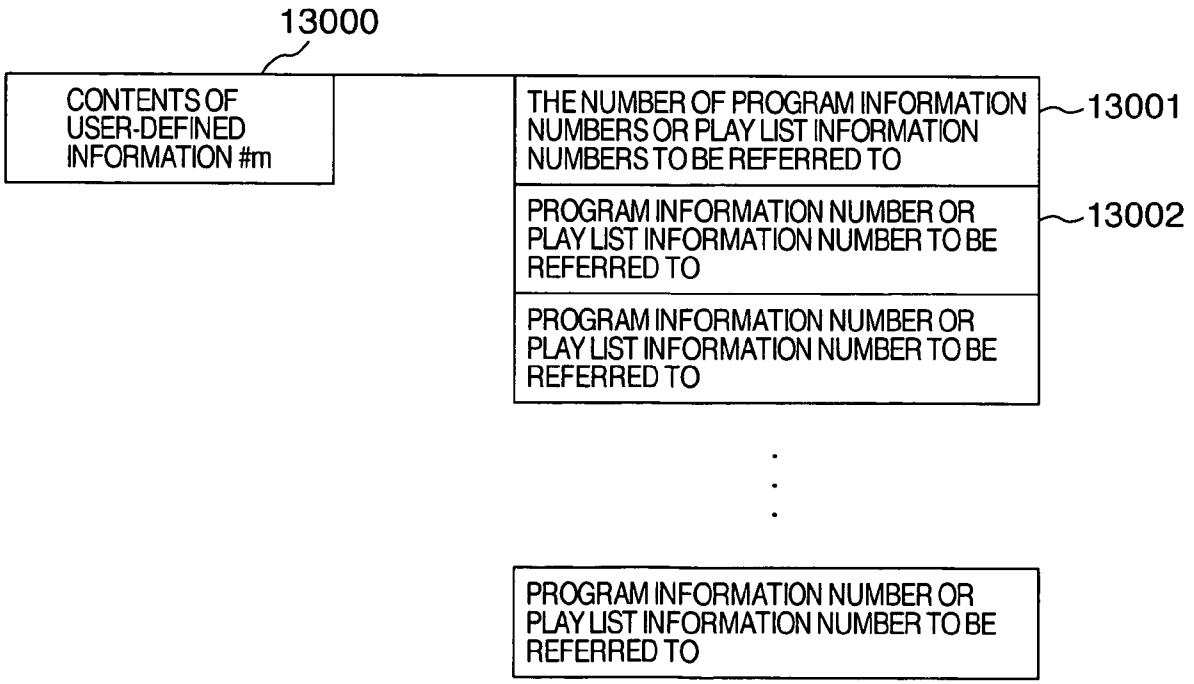

501
ALL PLAY LISTS
315
503
502

FIG.13


13000
CONTENTS OF USER-DEFINED INFORMATION #m
THE NUMBER OF PROGRAM INFORMATION NUMBERS OR PLAY LIST INFORMATION NUMBERS TO BE REFERRED TO
13001
PROGRAM INFORMATION NUMBER OR PLAY LIST INFORMATION NUMBER TO BE REFERRED TO
13002
PROGRAM INFORMATION NUMBER OR PLAY LIST INFORMATION NUMBER TO BE REFERRED TO
PROGRAM INFORMATION NUMBER OR PLAY LIST INFORMATION NUMBER TO BE REFERRED TO

EDITING METHOD AND RECORDING AND REPRODUCING DEVICE

INCORPORATION BY REFERENCE

The present application claims priorities from Japanese applications JP2004-349264 filed on Dec. 2, 2004, JP2004-378768 filed on Dec. 28, 2004, and JP2004-378767 filed on Dec. 28, 2004 the contents of which are hereby incorporated by reference into this application.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a recording and reproducing device which records data onto a recording medium and reproduces data from the recording medium.

2. Description of the Related Art

As the high-efficiency coding technique advances, it has become possible to handle AV data such as video data and audio data as digital data, conduct code rate compression, and record resultant data on a large-capacity recording medium such as a hard disk or a recording type optical disk in real time. When digital data already compressed in code rate is inputted to a recording and reproducing device having such a recording medium from outside by broadcasting or communication, it is also possible to record the digital data on the recording medium intact.

In these recording and reproducing devices, management information for managing digital data to be recorded is generated and recorded together onto the same recording medium. When a rewritable recording medium is used, the user can conduct editing work on the recording and reproducing device by rewriting the management information and generating and manipulating a list indicating the reproduction sequence (hereafter referred to as play list) (see, for example, JP-A-2000-152180).

SUMMARY OF THE INVENTION

In the above-described conventional technique, it is mentioned that the play list indicates the reproduction sequence by linking portions of AV data together. As an example, a management state of AV data on a recording medium in the above-described conventional technique is shown in FIG. **2**.

Reference numeral **201** designates AV data themselves on the recording medium. The case where a program #**1** to a program #**3** are present as recording units is shown. Reference numeral **202** designates a second management hierarchical level (management level **2**) in management information. Original cell information #**1** to original cell information #**3** indicate the whole reproduction range of program units, i.e., a program #**1** to a program #**3**, respectively. Each of user-defined cell information #**1** to user-defined information #**2** indicates a reproduction range of the whole or a part of a program arbitrarily specified by the user. The number of the user-defined cell information #**1** to user-defined information #**2** is increased or decreased by the user's editing manipulation. Reference numeral **203** designates a first management hierarchical level (management level **1**). Program information contains all of the original cell information #**1** to original cell information #**3**. By conducting reproduction on the basis of the program set information, the user can reproduce all AV data recorded on the recording medium. Play list information #**1** to play list information #k indicate a reproduction sequence of the user-defined cell information arbitrarily specified by the user. It is possible to have a plurality of reproduction sequences. Inside of a frame **204** becomes original information for managing the whole AV data in the management information. Inside of a frame **205** becomes user-defined information for managing the play list obtained by the user's editing manipulation.

In FIG. **2**, the play list information is placed on the same level with the program set information and managed as the management level **1**. Therefore, the sequence of a plurality of play list information pieces themselves is determined uniquely. For example, as for a catalog of the play lists, it is impossible on the user's interface to alter the display sequence. In view of the problem, the present invention has been achieved. An object of the present invention is to provide a recording scheme and device in which the user can conduct manipulation of arbitrarily rearranging the display sequence of the play lists in the play list catalog on the user interface.

Furthermore, in the conventional technique example, attention is not paid to that a plurality of users generate, select and manage favorite play list information. For example, even when a plurality of users desire to generate, select and manage respective favorite play list information pieces, it cannot be implemented. Furthermore, attention is not especially paid to that a user select some arbitrary play lists from among a plurality of play lists and manage them.

In view of these problems, the present invention has been achieved. An object of the present invention is to provide a recording and reproducing device in which the user can select and manage arbitrary play lists.

In order to achieve the objects, in accordance with the present invention, a unit of management for managing all registered play list information and an upper management hierarchical level are added. The unit of management is adapted to be handled on the same level with unified information that indicates a reproduction range of all AV data. User-defined unified information is adapted to be handled on the added management hierarchical level. The user-defined unified information is formed to allow arbitrary reproduction ranges contained on a lower hierarchical level to be registered.

In a recording and reproducing device according to the present invention, it becomes possible for the user to select arbitrary play lists or reproduction ranges and conduct management. Even in the case where a plurality of users share a single recording medium, therefore, each user can manage favorite reproduction contents, resulting in improved usage. Since the play lists are subject to unified management, it becomes possible for the user to arbitrarily alter the display sequence of play lists.

According to the present invention, a recording and reproducing device improved in usage can be provided.

Other objects, features and advantages of the invention will become apparent from the following description of the embodiments of the invention taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** shows a management state of AV data in a recording and reproducing device according to an embodiment of this invention;

FIG. **2** shows a management state of AV data in a conventional technique example;

FIG. **3** shows a block diagram of a recording and reproducing device according to an embodiment of this invention;

FIG. **4** shows a display output example of original unified information;

FIG. **5** shows a display output example of play list unified information;

FIG. **6** shows a first output example of user-defined unified information;

FIG. **7** shows a second output example of user-defined unified information;

FIG. **8** shows an example of a file structure of original unified information, play list unified information, user-defined unified information, play list information, program information, and AV data (program);

FIG. **9** shows an example of a management table structure of original unified information, play list unified information, and user-defined unified information;

FIG. **10** shows an example of a management table of play list information;

FIG. **11** shows an example of a management table of program list information;

FIG. **12** shows a display output example of play list unified information; and

FIG. **13** shows an example of a table indicating contents of user-defined information #m.

DESCRIPTION OF THE EMBODIMENTS

Hereafter, embodiments of the present invention will be described with reference to the drawings. FIG. **1** shows a management state of AV data on a recording medium in a recording and reproducing device according to the present invention. In the same way as the reference numeral **201** in FIG. **2**, reference numeral **101** designates AV data themselves on the recording medium. The case where programs #**1** to #**3** are present as recording units is shown.

Reference numeral **102** corresponds to **202** in FIG. **2**. However, reference numeral **102** designates a third management hierarchical level (management level **3**) in management information. Program information #**1** to program information #**3** indicate the whole reproduction ranges of program units, i.e., program #**1** to program #**3**, respectively. Each of program information #**2***a* to program information #**3***a* indicates a reproduction range of the whole or a part of a program arbitrarily specified by the user. The program information #**2***a* to program information #**3***a* indicate a part of the program #**2** and a part of the program #**3**, respectively. In places corresponding to the program information #**1** to program information #**3**, information is also added, as AV data is added, i.e., with an increase in programs. In places corresponding to the program information #**2***a* to the program information #**3***a*, the number of information pieces increases or decreases due to the editing manipulation of the user.

Reference numeral **103** corresponds to the management level **1** in FIG. **2**. However, numeral **103** designates a second management hierarchical level (management level **2**), which includes only play list information #**1** to play list information #n. Each play list information indicates a reproduction sequence of arbitrary program information pieces on the management level **3**. It is possible to have a plurality of reproduction sequences.

Reference numeral **104** designates a newly added first management hierarchical level (management level **1**) in the management information as a feature point of the present invention. The management level **1** includes a plurality of unified information pieces. Original unified information corresponds to the program set information shown in FIG. **2**. The original unified information contains all of the program information #**1** to program information #**3** on the management level **3**. By conducting reproduction on the basis of all of the program information #**1** to program information #**3**, it becomes possible for the user to reproduce all AV data recorded on the recording medium. Play list unified information contains all of the play list information #**1** to play list information #n on the management level **2**. By conducting reproduction on the basis of all of the play list information #**1** to play list information #n on the management level **2**, it becomes possible for the user to successively reproduce all registered play lists. User-defined unified information #**1** to user-defined unified information #m contain arbitrary one or more from among play list information pieces on the management level **2** and program information pieces on the management level **3**. For example, when a plurality of users use a single recording medium, it becomes possible to manage reproduced contents that meet respective users' tastes by using one user-defined unified information every user.

An embodiment of a recording and reproducing device according to the present invention will be described more specifically by using another drawing.

FIG. **3** is a block diagram showing an example of a recording and reproducing device according to the present invention. A recording and reproducing device capable of receiving digital broadcast, recording the digital broadcast on a recording medium, reproducing recorded data, and obtaining a reproduced output is shown. Reference numeral **300** designates a recording and reproducing device, **301** an input terminal supplied with a received wave from an antenna, **3011** an input terminal supplied with compressed video and audio data from another device, **3012** an analog video input terminal supplied with an analog video signal, **3013** an analog audio input terminal supplied with an analog audio input terminal, **333** and **334** analog/digital (A/D) conversion circuits each of which converts an analog signal to a digital signal, **302** a demodulation circuit, **330** a separation circuit which separates the demodulated digital signal into audio, video and other data, **335** a compression circuit which compresses digitized video and audio signals, **303** a recording unit signal processing circuit, **331** an encryption circuit which encrypts data to be recorded, **304** a recording and reproducing unit including a drive function of a recording medium, **305** a recording medium, **332** a decryption circuit which decrypts data encrypted and recorded on the recording medium, **306** a reproducing unit signal processing circuit, **307** a switchover circuit, **308** a separation circuit, **309** a video decoding circuit, **310** a digital/analog (D/A) conversion circuit, **311** a video output terminal, **312** an audio decoding circuit, **313** a D/A conversion circuit, **314** an audio output terminal, **315** a TV set, **316** a user I/F, **317** a control unit, **318** a system bus, **319** an OSD generation unit, and **320** an addition circuit.

At the time of recording, a signal transmitted by digital broadcast or the like and received is demodulated in the demodulation circuit **302** by using a predetermined scheme, subjected to necessary signal processing such as timing adjusting data addition and modulation in the recording unit signal processing circuit **303**, encrypted in the encryption circuit **331**, and then recorded on the recording medium **305** by the recording and reproducing unit **304**. A digital signal input from the digital input terminal **3011** is subjected to necessary signal processing such as timing adjusting data addition and modulation in the recording unit signal processing circuit **303**, encrypted in the encryption circuit **331**, and then recorded on the recording medium **305** by the recording and reproducing unit **304**. An analog video signal input from the analog video input terminal **3012** and an analog audio signal input from the analog audio input terminal **3013** are subjected to compression processing in the compression circuit **335**, encrypted in the encryption circuit **331** via the

recording unit signal processing circuit **303**, and then recorded on the recording medium **305** by the recording and reproducing unit **304**.

At the time of reproducing, encrypted digital data read out from the recording medium **305** via the recording and reproducing unit **304** in accordance with the user's order is decrypted in the decryption circuit **332**, subjected to signal processing required for reproduction such as demodulation in a form based on a predetermined modulation scheme in the reproducing unit signal processing circuit **103**, and sent to the separation circuit **308** via the switchover circuit **307**. Resultant video digital data is subjected to predetermined video decoding processing in the video decoding circuit **309**, converted to an analog signal in the D/A conversion circuit **310**, and then displayed as a monitor output on the TV set **315** via the video output terminal **311**. Audio digital data obtained from the separation circuit **308** is subjected to predetermined audio decoding processing in the audio decoding circuit **312**, converted to an analog signal in the D/A conversion circuit **313**, and then outputted by an audio output mechanism in the TV set **315** via the audio output terminal **314**.

The control unit **317** controls various components in the recording and reproducing device **300** via the system bus **318**. Furthermore, the control unit **317** controls the whole device to cause operation based on the user's order input which is inputted via the user I/F **316** to be conducted. By the way, an order input request to the user or necessary OSD display for the user is implemented by preparing it in the OSD generation unit **319**, adding it to an output of the video decoding circuit **309** on a suitable level, and finally outputting it to a monitor screen on the TV set **315**.

The case where each unified information on the management level **1** is used for menu display of recording data will now be described as a specific use example of the management information configuration in FIG. **1**.

FIG. **4** shows an example in which menu display is conducted by using the original unified information shown in FIG. **1**. Reference numeral **315** designates the TV set shown in FIG. **3**, **401** a tag for displaying all programs, **402** a thumbnail indicating program information #**1**, **403** a thumbnail indicating program information #**2**, and **404** a thumbnail indicating program information #**3**. The user moves a cursor position on the screen to a desired thumbnail and conducts selection and determination by using a remote controller or the like. As a result, the user can reproduce arbitrary programs or all programs.

FIG. **5** shows an example in which menu display is conducted by using the play list unified information shown in FIG. **1**. Reference numeral **501** designates a tag for displaying all play lists, **502** a thumbnail indicating play list information #**1**, and **503** a thumbnail indicating play list information #**2**. In the same way as the above-described case, the user moves a cursor position on the screen to a desired thumbnail and conducts selection and determination by using a remote controller or the like. As a result, the user can reproduce arbitrary play lists or all play lists. By the way, display switching from the all program display tag **401** to all play list display tag can be implemented by, for example, movement of the cursor in tag character positions conducted by the user.

FIG. **6** shows an example in which menu display is conducted by using the user-defined unified information #**1** shown in FIG. **1**. Reference numeral **601** designates a menu display tag for user #**1** (who is supposed to be "mother" here). As appreciated from FIG. **1**, reference numerals **402** and **502** designate thumbnails indicating the program information #**1** and the play list information #**1**, respectively. The "mother" can use the menu display tag for mother **601** as a folder dedicated to herself, and freely register and delete data to be reproduced. In the same way, FIG. **7** shows an example in which menu display is conducted by using the user-defined unified information #**2** shown in FIG. **1**. Reference numeral **701** designates a menu display tag for user #**2** (who is supposed to be "father" here). As appreciated from FIG. **1**, reference numerals **503** and **502** designate thumbnails indicating the play list information #**2** and the play list information #**1**, respectively. In this case, the "father" selects two play lists. However, the reproduction sequence of them can be altered. In the same way as the "mother," the "father" can use the menu display tag for father **701** as a folder dedicated to himself, and freely register and delete data to be reproduced.

As heretofore described, in the embodiment of the present invention, a unit of management for managing all registered play list information and an upper management hierarchical level are added. The unit of management is adapted to be handled on the same level with unified information that indicates a reproduction range of all AV data. User-defined unified information is adapted to be handled on the added management hierarchical level. The user-defined unified information is formed to allow arbitrary reproduction ranges contained on a lower hierarchical level to be registered therein. As a result, it becomes possible for the user to select arbitrary play lists or reproduction ranges and conduct management. Even in the case where a plurality of users share a single recording medium, therefore, each user can manage favorite reproduction contents, resulting in improved usage.

In the embodiment heretofore described, the case where digital broadcast is received and digital data is recorded intact has been described. However, this is not restrictive. A configuration having a network I/F to acquire AV data from an external network or having coding unit to conduct recording onto the recording medium while coding analog data may also be used. In other words, the present embodiment refers to data management on the recording medium, and its input route is not especially restricted.

FIG. **8** shows an example of file configurations used to actually record the program, program information, play list information, original unified information, play list unified information, and user-defined information on the recording medium **305** (FIG. **3**). The recording medium is a medium on which digital recording and reproducing are conducted. Files on the medium are managed by a file system similar to that used to manage a recording medium in the so-called personal computer or the like. In FIG. **8**, "ROOT" **800** represents a highest hierarchical level of a file directory. "TV_REC" **801** is a directory under the highest hierarchical level. "TVREC.MAN" **802**, "PGRG.IFO" **803**, "PGR.IFO" **804**, "PROGO001.TS" **805**, . . . of files which implement the management structure shown in FIG. **1** according to the present invention are recorded in the "TV_REC" **801**. In the "TVREC.MAN" **802**, the original unified information, the play list unified information, and the user-defined unified information #**1** to #m on the management level **1** shown in FIG. **1** are described as management tables. In the "PGRG.IFO" **803**, the play list information #**1** to the play list information #n on the management level **2** shown in FIG. **1** are recorded as management tables. In the "PGR.IFO" **804**, the program information #**1** to the program information #**3***a* on the management level **3** shown in FIG. **1** are recorded as management tables. "PROGO001.TS" **805**, "PROG0002.TS" **806** and "PROG0003.TS" **807** are entity files of AV data in each program. For example, AV data between recording start and recording end of one time is recorded in the "PROGO001.TS." AV data between recording start and recording end of the next time is recorded in the

"PROG0002.TS." In this way, the file name is updated and recording is conducted. Thereafter, the management files **802** to **804** are updated.

The file structure and the configuration of management tables themselves concerning the management structure "TVREC.MAN" **802**, "PGRG.IFO" **803**, "PGR.IFO" **804**, "PROG0001.TS" **805**, . . . of files may be formed by using any method. However, an example of how to implement the management configuration in the case of FIG. **1** using the files will now be described.

FIG. **9** shows a configuration of management tables of the "TVREC.MAN" **802** (FIG. **8**). As original unified information **901**, the number of AV data recorded as the number of program information pieces **9011**, i.e., the total number (three in this case) of entity files ("PROG0001.TS" **805**, "PROG0002.TS" **806** and "PROG0003.TS" **807**) of the AV data is described. Under the original unified information **901**, location tables **9012** of respective original program information pieces are recorded. As play list unified information **902**, play list location information tables are recorded in **9021** and subsequent tables. In **9031**, the number of user-defined unified information pieces is recorded. After that, contents of #**1** to #m of the user-defined information are recorded.

FIG. **13** shows contents of the user-defined information #m described above. The user-defines information #m has combinations of original program information and play list information as a table.

FIG. **10** shows a management table of the "PGRG.IFO" **803** (FIG. **8**), which corresponds to the management level **2** shown in FIG. **1**. As play list information **1001**, the total number of the play list information pieces is first described as designated by **10011**. (In this case, the total number of the play list information pieces is n.) Beginning with **10012** indicated under the reference numeral **10011**, locations in which contents of the play list information #**1** to #n are described are recorded as tables. Beginning with **10013**, contents of the play list information #**1** to #n (contents of the reproduction sequence, which are management tables having combinations of program information indicating the reproduction start location and reproduction end location of AV data described later) are recorded.

FIG. **11** shows a management table of the "PGR.IFO" **804** (FIG. **8**), which corresponds to the management level **3** shown in FIG. **1**. As program information **1101**, the total number of the program information pieces including all of the program information pieces paired with the original information program #**1**, #**2** and #**3** (FIG. **1**) and the user-defined program information #**2***a* and #**3***a* (FIG. **1**) is recorded as designated by **11011**. Beginning with **11012** indicated under the reference numeral **11011**, tables indicating locations in which contents of the program information #**1** to #**3***a* are described are recorded. Beginning with **11013**, contents of the program information #**1** to #**3***a* (describing the reproduction start location and reproduction end location of the "PROG001.TS" **805**, "PROG0002.TS" **806** and "PROG0003.TS" **807** (FIG. **8**)) are recorded.

By conducting the management as heretofore described, it becomes possible to sort the location information, for example, in the play list location table **9021** and alter the sequence of displaying play lists on a GUI view from the state shown in FIG. **5** to the state shown in FIG. **12**. In the case where the number of play lists has become very large, a play list that is high in user's use frequency can be displayed in the first place in the GUI view. As a result, it is possible to implement a usable recording and reproducing device, reproducing device, or recording method. For example, a plurality of users can set play lists that they want to view and recorded original contents freely and individually. Even when the number of recorded programs is very large, the user can rapidly find out a program that the user wants to view, because the user can refer to a folder defined by the user.

In the present embodiment, a clear distinction is made between the user-defined play list unified information and the user-defined unified information #**1** to #m. The user-defined play list unified information may be defined as user-defined play list unified information having no link to the original program information of the user-defined unified information.

It should be further understood by those skilled in the art that although the foregoing description has been made on embodiments of the invention, the invention is not limited thereto and various changes and modifications may be made without departing from the spirit of the invention and the scope of the appended claims.

The invention claimed is:

1. A recording method including a recording step for recording on a recording medium AV data and management information used to manage the AV data,

the management information comprising:

program information paired with the AV data;

original unified information for managing history of the program information;

user-defined program information which is arbitrarily defined by a user to manage reproduction positions of the AV data;

play list information for managing a reproduction sequence of the user-defined program information or the program information paired with the AV data; and

play list unified information for managing history of the play list information,

wherein as for the management information,

the original unified information and the play list unified information are placed on a first management hierarchical level,

the play list information is placed on a second management hierarchical level, and

the program information paired with the AV data and the user-defined program information are placed on a third management hierarchical level.

2. A recording method including a recording step for recording on a recording medium AV data and management information used to manage the AV data,

the management information comprising:

program information paired with the AV data;

original unified information for managing history of the program information;

user-defined program information which is arbitrarily defined by a user to manage reproduction positions of the AV data;

play list information for managing a reproduction sequence of the user-defined program information or the program information paired with the AV data; and

play list unified information for managing history of the play list information,

wherein

the original unified information, the play list unified information, and the user-defined unified information are placed on a first management hierarchical level,

the play list information is placed on a second management hierarchical level,

the program information paired with the AV data and the user-defined program information are placed on a third management hierarchical level, and

AV data of recorded programs are placed on a lowest management hierarchical level.

3. A recording and reproducing device comprising:

a receiving circuit for receiving input AV data;

a recording unit signal processing circuit for recording AV data received by the receiving circuit on a recording medium;

a reproducing unit signal processing circuit for reproducing the AV data from the recording medium;

output unit for outputting AV data read out from the reproducing unit signal processing circuit;

user interface unit manipulated by a user; and

control unit for controlling each of the circuits in response to input from the user interface means,

wherein at time of recording, the AV data and management information for managing the AV data are recorded by the control unit and the recording unit signal processing circuit, and

wherein the management information comprises:

program information paired with the AV data and original unified information for managing history of the program information

user-defined program information which is arbitrarily defined by the user to manage reproduction positions of the AV data;

play list information for managing a reproduction sequence of the user-defined program information or the original program information; and

play list unified information for managing history of the play list information,

wherein as for the management information,

the original unified information and the play list unified information are placed on a first management hierarchical level,

the play list information is placed on a second management hierarchical level, and

the program information paired with the AV data and the user-defined program information are placed on a third management hierarchical level.

4. A recording and reproducing device comprising:

a receiving circuit for receiving input AV data;

a recording unit signal processing circuit for recording AV data received by the receiving circuit on a recording medium;

a reproducing unit signal processing circuit for reproducing the AV data from the recording medium;

output unit for outputting AV data read out from the reproducing unit signal processing circuit

user interface unit manipulated by a user; and

control unit for controlling each of the circuits in response to input from the user interface means,

wherein at time of recording, the AV data and management information for managing the AV data are recorded by the control unit and the recording unit signal processing circuit, and

wherein the management information comprises:

program information paired with the AV data and original unified information for managing history of the program information;

user-defined program information which is arbitrarily defined by the user to manage reproduction positions of the AV data;

play list information for managing a reproduction sequence of the user-defined program information or the original program information; and

play list unified information for managing history of the play list information,

wherein

the original unified information, the play list unified information and the user-defined unified information are placed on a first management hierarchical level,

the play list information is placed on a second management hierarchical level, and

the program information paired with the AV data and the user-defined program information are placed on a third management hierarchical level.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 7,613,383 B2
APPLICATION NO. : 11/203457
DATED : November 3, 2009
INVENTOR(S) : Yoshida et al.

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

On the Title Page:

The first or sole Notice should read --

Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 1098 days.

Signed and Sealed this

Fourteenth Day of December, 2010

David J. Kappos

David J. Kappos
Director of the United States Patent and Trademark Office