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**(54) [Title of the Invention] Editing Method and Recording and Playback Device**

**(57) [Claims]**

**[Claim 1]**

A recording method that records a program and management information for managing the program, having

\_\_\_\_\_ a step for recording the program, and

\_\_\_\_\_ step for recording the management information,

\_\_\_\_\_ wherein the step for recording the management information

\_\_\_\_\_ records management information having original program information indicating a playback range which

is the entirety of a program, user defined program information indicating a playback range which is the entirety of or

part of the program, playlist information indicating a playback order of the original program information or the user

defined program information, and user defined folder information including at least either the original program

information or the playlist information,

\_\_\_\_\_ wherein the management information

\_\_\_\_\_ uses the user defined folder information as a first management level,

\_\_\_\_\_ uses the playlist information as a second management level, and

\_\_\_\_\_ uses the original program information and the user defined program information as a third management

level,

\_\_\_\_\_ wherein the program and the management information are recorded on the same recording medium, and

\_\_\_\_\_ wherein the user defined folder information can reference both the original program information and the

playlist information.

**[Claim 2]**

A recording device that records a program and management information for managing the program on a recording medium, having  
a recording means for recording the program and the management information on the recording medium,  
and  
a control means for controlling the recording means,  
wherein the recording means  
records management information having original program information indicating a playback range which is the entirety of a program, user defined program information indicating a playback range which is the entirety of or part of the program, playlist information indicating a playback order of the original program information or the user defined program information, and user defined folder information including at least either the original program information or the playlist information,  
wherein the management information  
uses the user defined folder information as a first management level,  
uses the playlist information as a second management level, and  
uses the original program information and the user defined program information as a third management level,  
wherein the program and the management information are recorded on the same recording medium, and  
wherein the user defined folder information can reference both the original program information and the playlist information.

[Detailed Description of the Invention]

[Technical Field]

[0001]

The present invention relates to a recording and playback device which records and plays back data on a recording medium.

[Background Art]

[0002]

As high-performance encoding technology has advanced, it has become possible to compress audiovisual data such as video and audio in the form of digital data, and to record the digital data in real time on large capacity recording media such as hard disks and recordable optical discs, for example. With a recording and playback device provided with such recording media, when digital data is imported from the outside in a pre-compressed state via a broadcast or communication, the digital data can be recorded as-is on the recording medium.

[0003]

With such recording and playback devices, management information for managing the recorded digital data is generated and recorded on the same recording medium. If a rewritable recording medium is used, a user can perform editing in the recording and playback device by generating and manipulating a list (henceforth referred to as a playlist) in which the management information is rewritten to indicate a playback order (see, for example, Patent Document 1).

[0004]

[Patent Document 1] JP 2000-152180 A

[Disclosure of the Invention]

[Problem to Be Solved by the Invention]

[0005]

The prior art mentions a playlist which indicates a playback order by connecting parts of audiovisual data. FIG. 2 shows audiovisual data being managed on a recording medium in the prior art, as an example.

[0006]

201 is the audiovisual data itself on the recording medium, with program #1 to program #3 being shown as recording units. 202 shows a second management level (management level 2) in the management information, with original cell information #1 to original cell information #3 indicating playback ranges which are the entirety of the program units, i.e., program #1 to program #3, respectively. user defined cell information #1 to user defined cell information #2 show playback ranges which are the entirety of or parts of the programs, optionally designated by the user, the number thereof increasing or decreasing depending on editing operations by the user. 203 indicates a first management level (management level 1) of the management information; program set information includes all of original cell information #1 to original cell information #3 and can be played by the user to play back all the audiovisual information recorded on the recording medium. Playlist information #1 to playlist information #k indicate playback order of the user defined cell information optionally designated by the user, and many can coexist. The outline shown by 204 is the original information managing all the audiovisual data in the management information, and the outline shown by 205 is the user defined information for managing playlists by means of editing operations by the user.

[0007]

In FIG. 2, playlist information is managed as management level 1 on the same row as the program set information, so the order of multiple instances of the playlist information is determined uniquely, making it impossible to change the display order of the playlists in the user interface, for example. The present invention was devised in light of this and has as an object to provide a recording method and device allowing a user to optionally rearrange the listed display order of playlists in the user interface.

[0008]

Furthermore, in the prior art, no consideration was given to multiple users generating, selecting, and managing their own playlist information. For example, it would be impossible for multiple users to generate, select, and manage their own playlists, respectively, even if they wanted to. In particular, no consideration was given to users selecting and managing a particular number of playlists from among multiple playlists.

[0009]

The present invention was devised in light of these points, and has as an object to provide a recording and playback device allowing the user to select and manage any number of playlists.

[Means for Solving the Problem]

[0010]

In order to achieve this object, the present invention uses the configuration set down in the claims as one example.

[Effects of the Invention]

[0012]

With the present invention, a recording and playback device with improved ease-of-use can be provided.

[Best Mode for Embodying the Invention]

[0013]

Embodiments of the present invention are described below with reference to the drawings. FIG. 1 is a view showing audiovisual data managed on a recording medium in a recording playback device according to the present invention. 101, like 201 in FIG. 2, is the audiovisual data itself on the recording medium, program #1 to program #3 being shown as recording units.

[0014]

102 corresponds to 202 in FIG. 2, but with a third management level (management level 3) being shown in the management information. Program information #1 to program information #3 indicate playback ranges which are the entirety of the program units, i.e., program #1 to program #3, respectively. Program information #2a and program information #3a indicate playback ranges which are the entirety of or parts of programs optionally designated by the user, part of program #2 and part of program #3 being indicated here, respectively. Places corresponding to program information #1 to program information #3 are additions to the audiovisual data and increase in number as the number of programs increases. The number of places corresponding to program information #2a or program information #3a, for example, increases and decreases depending on editing operations by the user.

[0015]

103 corresponds to management level 1 in FIG. 2, but shows a second management level (management level 2) of the management information, including only playlist information #1 to playlist information #n. Each instance of playlist information indicates a playback order of program information in management level 3, and many can coexist.

[0016]

104 is a feature of the present invention, a newly added first management level (management level 1) of the management information, which includes multiple instances of integrated information. Integrated original information corresponds to the program set information FIG. 2, includes program information #1 to program information #3 in management level 3, and can be played back by the user to play back all the audiovisual data recorded on the recording medium. Integrated playlist information includes all of playlist information #1 to playlist information #n in management level 2 and can be played back by the user to sequentially play back all the playlists which have been registered. Integrated user defined information #1 to integrated user defined information #m include one or more instances of the playlist information in management level 2 and the program information in management level 3. For example, if multiple users are using one recording medium, playback content matching the preferences of each user can be managed by using one instance of the integrated user defined information for each user.

Embodiments of the recording and playback device according to the present invention are described next in slightly more detail, with reference to other drawings.

[0017]

FIG. 3 is a block diagram showing one example of the recording and playback device according to the present invention, showing a recording and playback device capable of receiving digital broadcasts, recording the digital broadcasts on a recording medium, playing back recorded data, and obtaining playback output. 300 is a recording and playback device, 301 is an input terminal which inputs reception waves from an antenna, 3011 is an input terminal for inputting compressed audiovisual data from another device, 3012 is an analog video input terminal for inputting an analog video signal, 3013 is an analog audio input terminal for inputting an analog audio signal, 333 and 334 are analog/digital (A/D) conversion circuits which convert analog signals into digital signals, 302 is a demodulation circuit, 330 is a demultiplexing circuit which separates the demodulated digital signal into audio, video, and other data, 335 is a compression circuit which compresses digitized video and audio signals, 303 is a recording system signal processing circuit, 331 is an encryption circuit for encrypting recorded data, 304 is a recording and playback system including drive functionality for the recording medium, 305 is a recording medium, 332 is a decryption circuit for decrypting data which has been encrypted and recorded on the recording medium, 306 is a playback system signal processing circuit, 307 is a switching circuit, 308 is a splitting circuit, 309 is a video decoding circuit, 310 is a digital/analog (D/A) conversion circuit, 311 is a video output terminal, 312 is an audio decoding circuit, 313 is a D/A conversion circuit, 314 is an audio output terminal, 315 is a television set, 316 is a user interface, 317 is a control unit, 318 is a system bus, 319 is an OSD generation unit, and 320 is an adder circuit. [0018]

During recording, a signal transmitted by digital broadcast, for example, and received is demodulated using a predetermined method in the demodulation circuit 302 and then subjected to any requisite signal processing such as modulation or addition of data for timing adjustment in the recording system signal processing circuit 303 before being encrypted in the encryption circuit 331 and recorded on the recording medium 305 by the recording and playback system 304. The digital signal input by the digital input terminal 3011 is subjected to any requisite signal processing such as modulation and addition of data for timing adjustment in the recording system signal processing circuit 303 before being encrypted in the encryption circuit 331 and recorded to the recording medium 305 by the recording and playback system 304. The analog video signal input by the analog video input terminal 3012 and the analog audio signal input by the analog audio input terminal 3013 are compressed in the compression circuit 335, pass through the recording system signal processing circuit 303, and are encrypted by the encryption circuit 331 before being recorded on the recording medium 305 by the recording and playback system 304. [0019]

During playback, encrypted digital data read via the recording and playback system 304 from the recording medium 305 in response to a user command is decrypted by the decryption circuit 332, subjected to any requisite signal processing for playback such as demodulation in a manner consistent with a predetermined modulation method in the playback system signal processing circuit 103 and sent to the splitter circuit 308 via the switching circuit 307. Predetermined video decoding processes are carried out in the video decoding circuit 309, and after conversion of the digital data to an analog signal has been carried out in the D/A conversion circuit 310, the analog signal is displayed as monitor output to the television set 315 via the video output terminal 311. Predetermined audio decoding processes are carried out in the audio decoding circuit 312, and after the digital data has been converted to an analog signal in the D/A conversion circuit 313, the analog signal is output by an audio output mechanism in the television set 315 via the audio output terminal 314. [0020]

The control unit 317 controls every part of the recording and playback device 300 via the system bus 318, and controls the entire device so as to carry out operations based on instructions input by the user via the user interface 316. Requests for the user to input instructions and as well as any necessary OSD displays to the user are prepared by the OSD generation unit 319, added by the adder circuit 320 at a level appropriate for the output of the video decoding circuit 309, and ultimately output to the monitor screen of the television set 315. [0021]

A case in which the integrated information in management level 1 is used in a recorded data menu display is described next as a specific use case of the management information configuration in FIG. 1. [0022]

FIG. 4 is an example of a menu display using the integrated original information in FIG. 1. 315 is the television set in FIG. 3, 401 is an all program display tag, 402 is a thumbnail showing program information #1, 403 is a thumbnail showing program information #2, and 404 is a thumbnail showing program information #3. The user can move the position of a cursor on the screen using a remote control or the like to select the desired thumbnail and play back any or all of the programs. [0023]

Next, FIG. 5 is an example of a menu display using the integrated playlist information in FIG. 1. 501 is an all playlist display tag, 502 is a thumbnail showing playlist information #1, and 503 is a thumbnail showing playlist

information #2. The user can move the position of the cursor on the screen using a remote control or the like to select the desired thumbnail and play back any or all of the playlists. Switching from the all program display tag 401 to the all playlist display tag 501 can be done, for example, by the user moving the cursor to the writing on the tag. [0024]

Next, FIG. 6 is an example of a menu display using integrated user defined information #1 in FIG. 1. 601 is a user #1 (here being "mom") menu display tag, and 402 and 502 are the thumbnails showing program information #1 and playlist information #1, as can be seen from FIG. 1. "Mom" can freely register and delete data to be played back, using the mom menu display tag 601 as her own folder.

Similarly, FIG. 7 is an example of a menu display using integrated user defined information #2 in FIG. 1. 701 is a user #2 (here being "dad") menu display tag, and 503 and 502 are the thumbnails for playlist information #2 and playlist information #1, as can be seen from FIG. 1. In this case, "dad" has selected two playlists and can change the playback order. As with "mom" above, "dad" can freely register and delete data to be played back, using the dad menu display tag 701 as his own folder.

[0025]

Thus, in this embodiment of the present invention a configuration is used in which management units and an upper management level are added for managing all registered playlist information, which is therefore handled on the same level as the integrated information indicating playback ranges for all audiovisual data, integrated information using user definitions is handled in the added management level, and the playback ranges included in lower levels can be registered in the integrated information, all of which improves ease-of-use since each user can manage his or her own desired playback content individually, even when multiple users share the same recording medium, as users can select and manage their own playlists and/or playback ranges.

[0026]

In the foregoing embodiment, a case was described in which a digital broadcast is received and the digital data is recorded as-is, but this is not a limitation. It is also possible to use a configuration in which a network interface is provided, audiovisual data is acquired from an external network, an encoding means is provided, and analog data is encoded and recorded to a recording medium. In other words, the present embodiment mentions data management on the recording medium but does not impose any particular limitations on the input path.

[0027]

FIG. 8 shows an example of a file structure used to record the programs, program information, playlist information, integrated original information, integrated playlist information, and user defined information discussed above on the recording medium 305 (FIG. 3). The recording medium is a medium for digital recording and playback, and the files on the medium are managed using the same type of file system as is used for managing recording media using what is known as a personal computer. In this drawing, ROOT 800 indicates the uppermost level of the file directory, with TV\_REC 801 being a subdirectory thereof, and TVREC.MAN 802, PGRG.IFO 803, PGR.IFO 804, and PROG0001.TS 805..., which are files for realizing the management structure shown in FIG. 1 according to the present invention, being recorded within TV\_REC 801. TVREC.MAN 802 stores the integrated original information, integrated playlist information, and information of integrated user defined information #1 to #m, which are in management level 1 as shown in FIG. 1, as a management table. PGRG.IFO 803 stores the information of playlist information #1 to #n, which are in management level 2 as shown in FIG. 1, as a management table. PGR.IFO 804 stores information of program information #1 to #3a which are in management level 3 as shown in FIG. 1, as a management table. PROG0001.TS 805, PROG0002.TS 806, and PROG0003.TS 807 are the actual audiovisual data files of the programs. For example, PROG0001.TS is everything from start to stop in one recording, with the filename updated to PROG0002.TS for everything from start to stop in the next recording. Thereafter management file 802 is updated to 804.

[0028]

Note that any method may be used to configure the file structure and management data configuration themselves as relates to the management structure of the files TVREC.MAN 802, PGRG.IFO 803, PGR.IFO 804, PROG0001.TS 805, .... An example is described below of how these files are used to realize the management configuration in the case shown in FIG. 1.

[0029]

FIG. 9 shows the management table configuration of TV\_REC.MAN 801 (FIG. 8). Integrated original information 901 includes the number of instances of audiovisual data recorded as a program information count 9011, i.e. the total number of actual audiovisual data files (three in this case: PROG0001.TS 805, PROG0002.TS 806, and PROG0003.TS 807), with a location table 9012 of the instances of original program information being written there below. A playlist position information table 9021 for playlists #1 to #3a is written there below as integrated playlist information 902. The number of instances of integrated user defined information is written below 9031, recording the content of user defined information #1 to #m there below.

[0030]

FIG. 13 is a view showing the content of the user defined information #m. The user defined information #m holds in table form which original program information and which playlist information are combined.  
[0031]

FIG. 10 shows a management table for PGRG.IFO 803 (FIG. 8) corresponding to management level 2 in FIG. 1. The total number of instances of playlist information (n in this case) is written first in 10011 as playlist information 1001 and then the locations where the content of playlist information #1 to #n are recorded as a table starting from 10012. The content of playlists #1 to #n (a management table indicating how to combine program information, etc. indicating the playback start locations and playback and locations, etc., of the audiovisual data discussed below, i.e., the content of the playback sequences) is recorded starting from 10013.  
[0032]

FIG. 11 shows a management table for PGR.IFO 804 (FIG. 8) corresponding to management level 3 in FIG. 1. In program information 1101, the number of instances of program information forming pairs with programs #1, #2, and #3 (FIG. 1) of program information (original information and program information including all of program information #2a and/or 3a (FIG. 1) defined by the user are recorded in 11011, and a table showing the locations describing the content of the program information from program information #1 to #3a is recorded in 11012 there below, and the content of program information #1 to #3a (writing the positions to play back from where to where in the audiovisual data files PROG0001.TS 805, PROG0002.TS 806, and PROG0003.TS 807 (FIG. 8)) is recorded in 11013 there below.  
[0033]

By performing management in this manner, it is possible to sort the position information in the playlist position table 9021 and change the order with which the playlists are displayed in a GUI screen from the state shown in FIG. 5 to the state shown in FIG. 12, and even when the number of playlists is extremely high, the user playlist with the highest frequency can be displayed first in the movie screen, thereby making it possible to realize a recording playback device or playback device or recording method which is extremely easy to use for users. For example, since multiple users can individually set original content which has been recorded or playlists they want to watch, they can reference folders they have defined themselves to look for programs they want to watch, even if the number of recorded programs is extremely high, making it possible to quickly find the programs they want to watch.  
[0034]

Note that in the present embodiment, the user defined integrated playlist information is clearly distinguished from the integrated user defined information #1 to #m, but may be the positioning of user defined integrated playlist information without a link to the original program information in the integrated user defined information.

A preferable embodiment of the present invention has been described above. According to this embodiment of the present invention, an upper management level and management units for managing all registered playlist information are added, and the management units are treated as being on the same level as the integrated information showing the playback ranges for all audiovisual data. The integrated information which has been user defined is handled in the added management level, and any playback ranges included in the lower levels can be registered in the integrated information.

With the recording and playback device according to the present invention, a user can select and manage playlists and/or playback ranges, making it possible to manage playback content for each user even when multiple users share a single recording medium, which improves ease-of-use, and since integrated management of playlists is possible, users can change the display order, etc., of playlists as they see fit.

[Brief Description of the Drawings]

[0035] FIG. 1 is a view showing AV data managed in a recording and playback device according to an embodiment.

FIG. 2 is a view showing AV data managed according to the prior art.

FIG. 3 is a block diagram of the recording and playback device according to an embodiment.

FIG. 4 is a display output example of integrated original information.

FIG. 5 is a display output example of integrated playlist information.

FIG. 6 is a first display output example of integrated user defined information.

FIG. 7 is a second display output example of integrated user defined information.

FIG. 8 is a view showing an example of a file structure for integrated original information, integrated playlist information, integrated user defined information, playlist information, program information, and audiovisual data (programs).

FIG. 9 is a view showing an example of a management table structure for integrated original information, integrated playlist information, and integrated user defined information.

FIG. 10 is a view showing an example of a management table for playlist information.

FIG. 11 is a view showing an example of a management table for program information.  
 FIG. 12 is a display output example for integrated playlist information.  
 FIG. 13 is a view showing an example of a table showing the content of user defined information #m.  
 [Explanation of the Reference Numerals]

[0036]

101, 201 ... Programs (audiovisual streams)  
 102 ... Third level in management information  
 103, 202 ... Second level in management information  
 104, 203 ... First level in management information  
 303 ... Recording system signal processing  
 304 ... Recording and playback system  
 305 ... Recording medium  
 306 ... Playback system signal processing  
 315 ... Television set  
 316 ... User interface  
 317 ... Control unit  
 318 ... System bus  
 319 ... OSD generation unit  
 401 ... All program display tag  
 501 ... All playlist display tag  
 601 ... User #1 menu display tag  
 701 ... User #2 menu display tag

FIG. 1

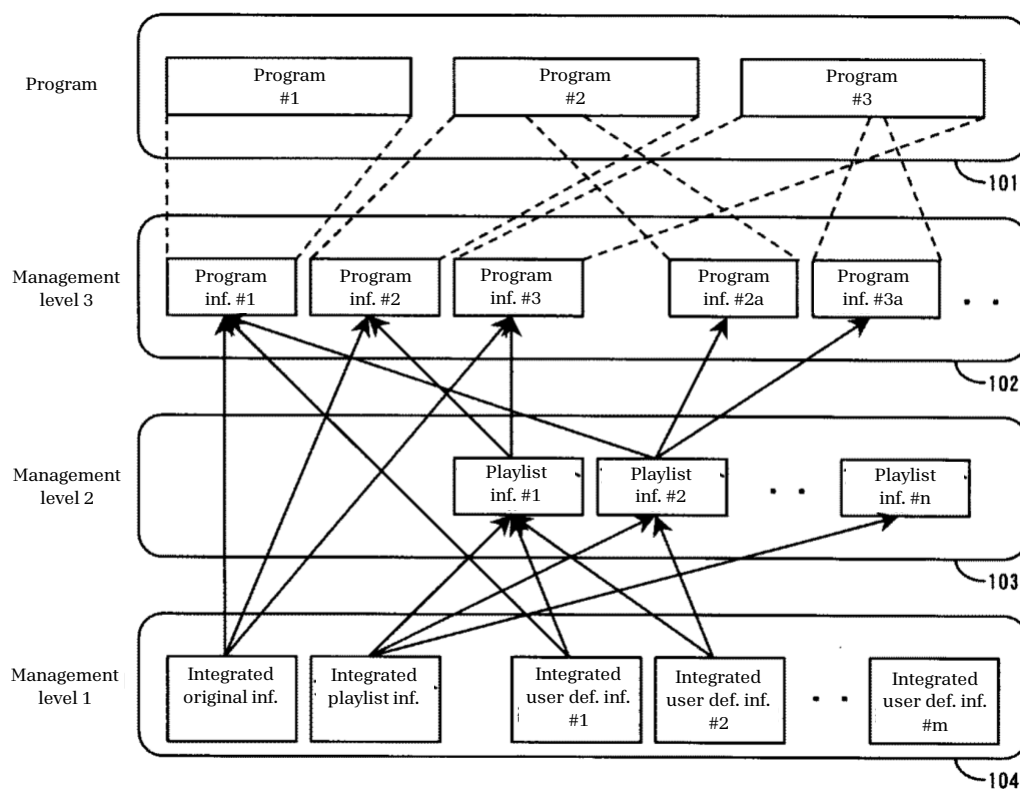


FIG. 2

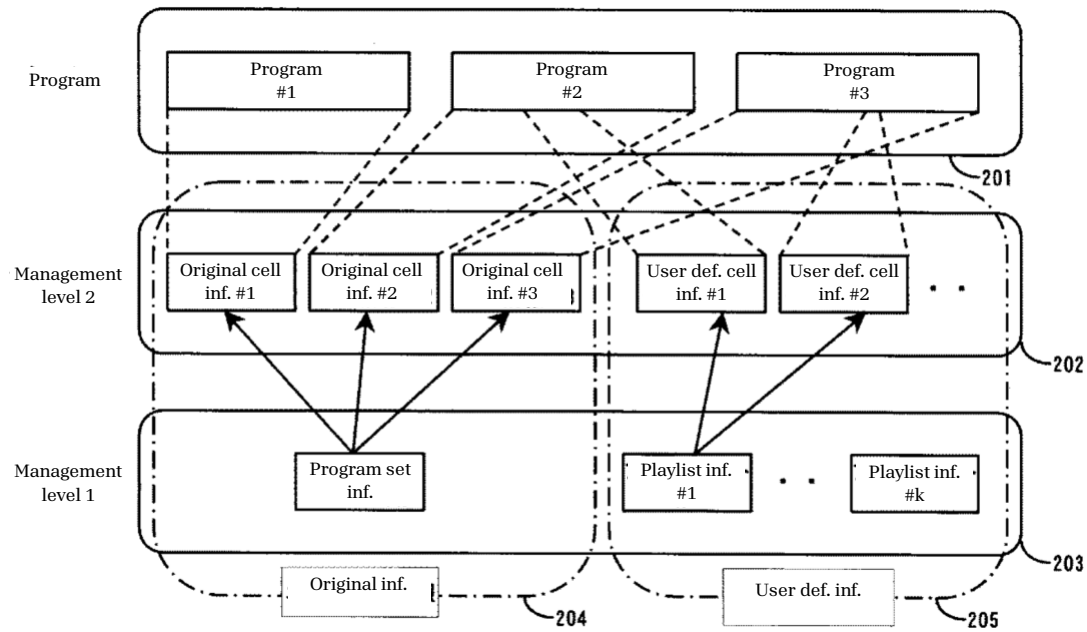


FIG. 3

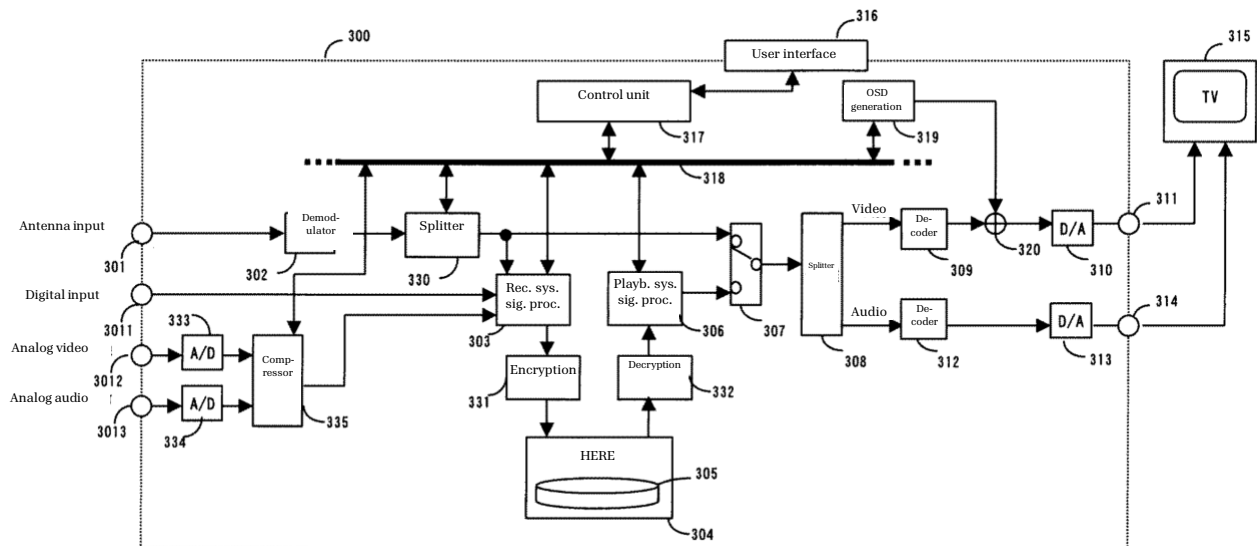


FIG. 4

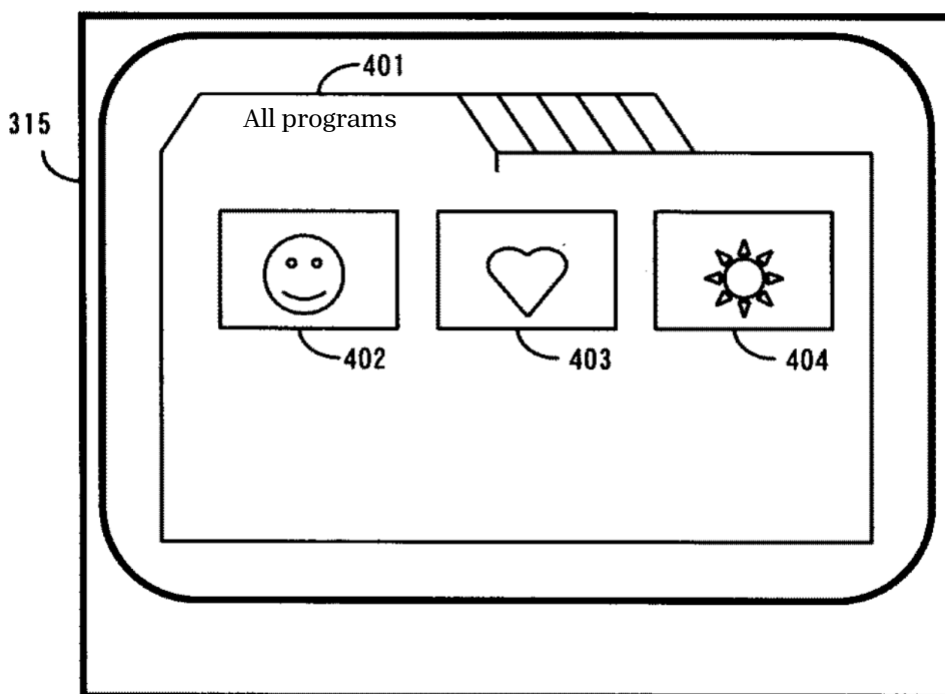


FIG. 5

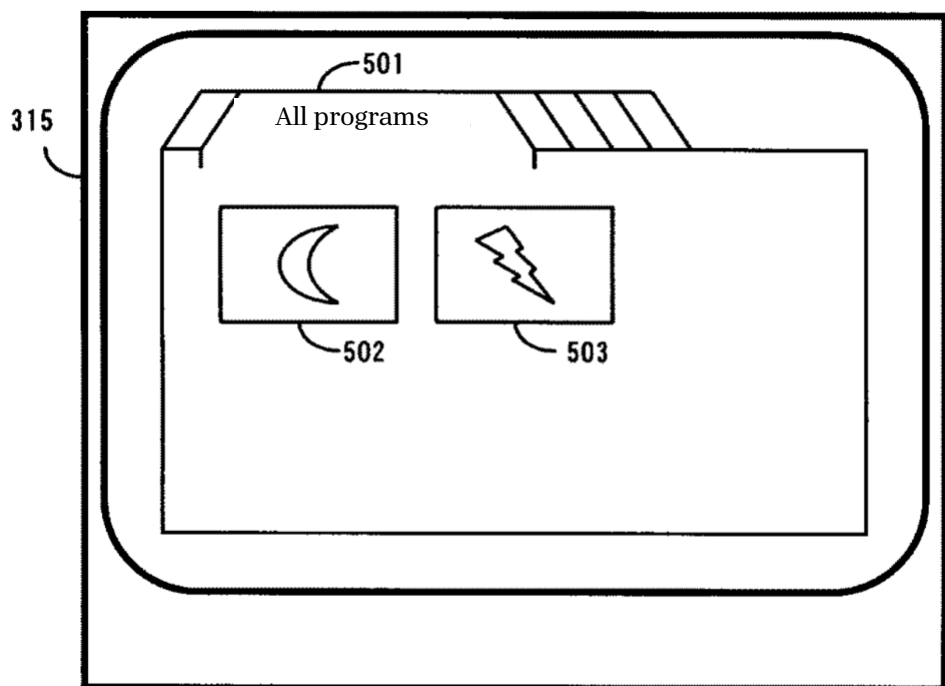


FIG. 6

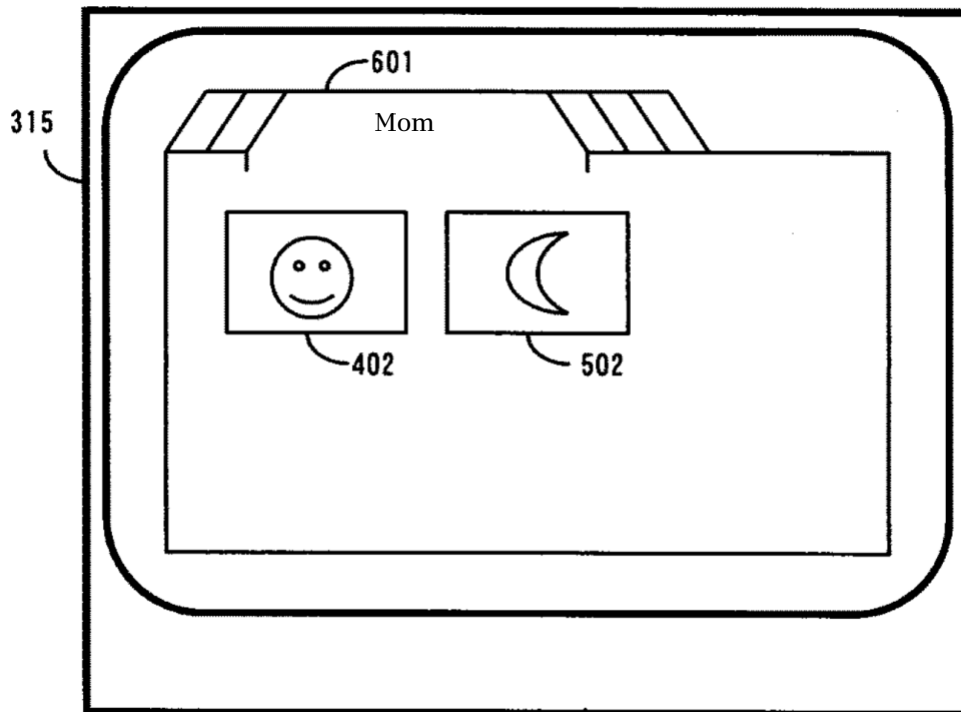


FIG. 7

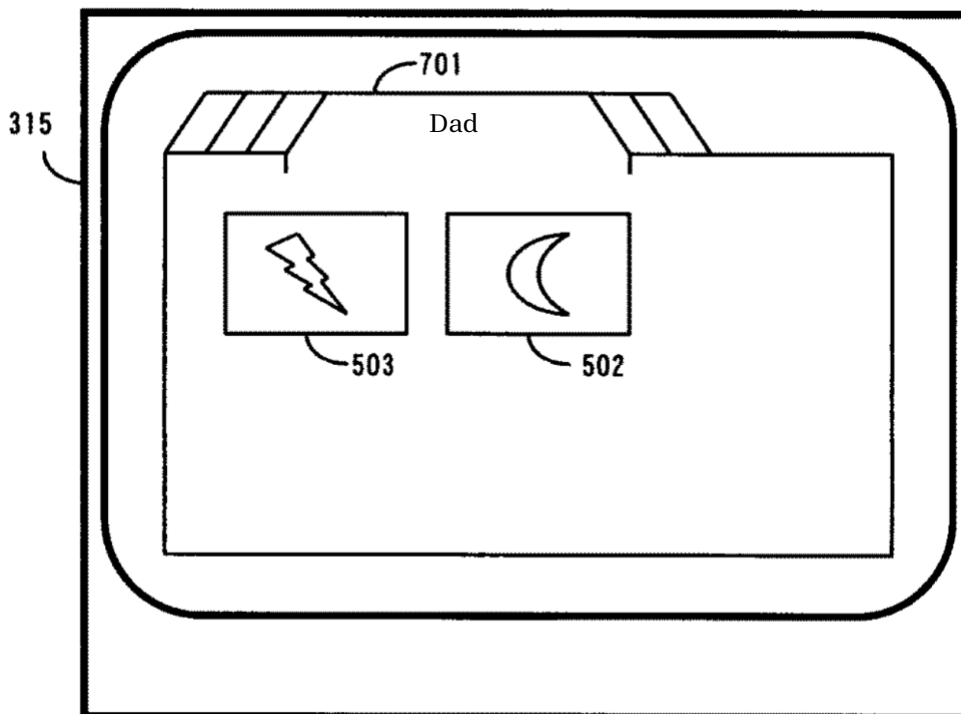


FIG. 8

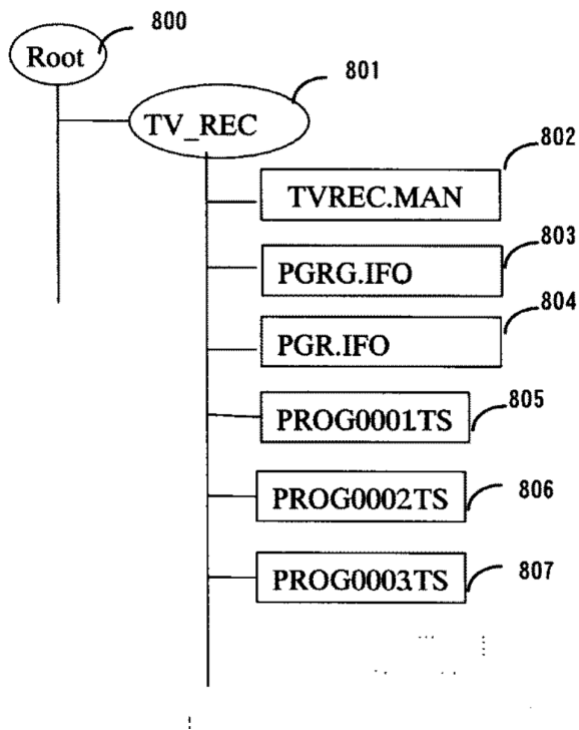


FIG. 9

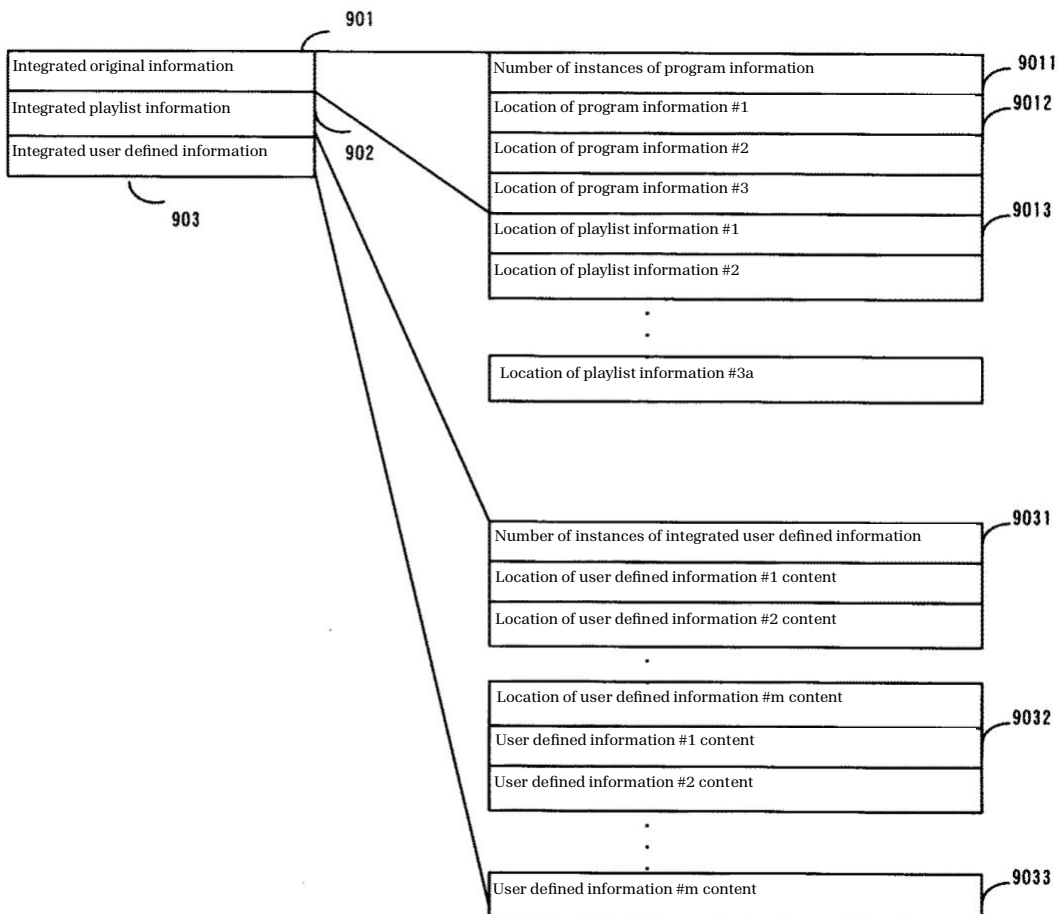


FIG. 10

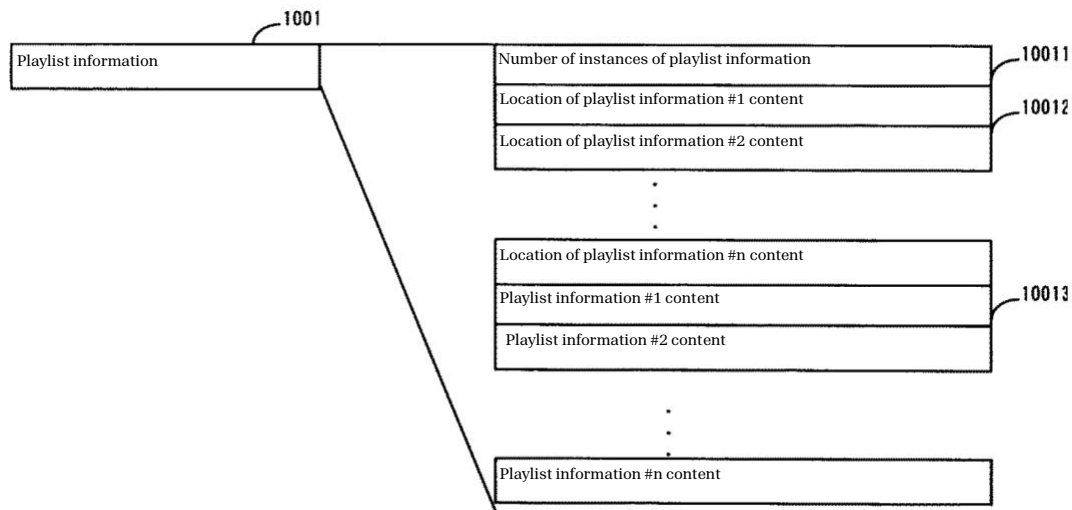


FIG. 11

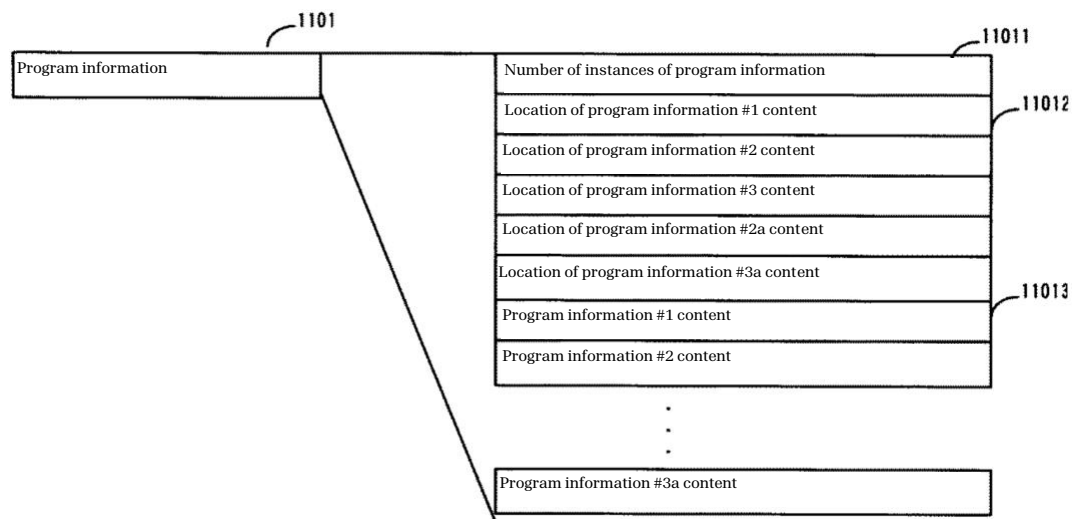


FIG. 12

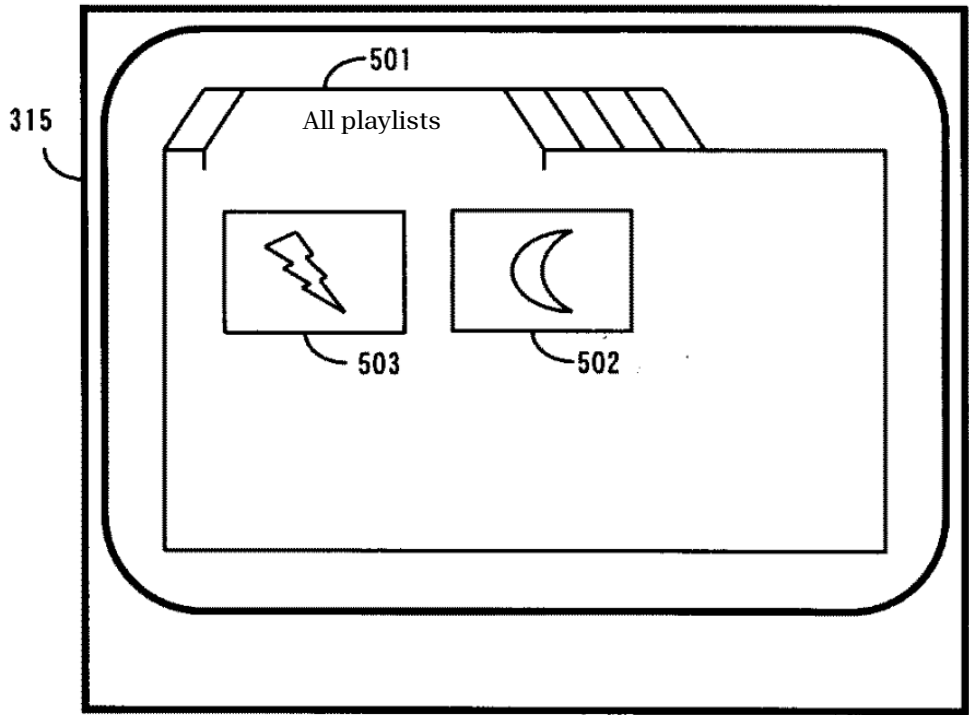
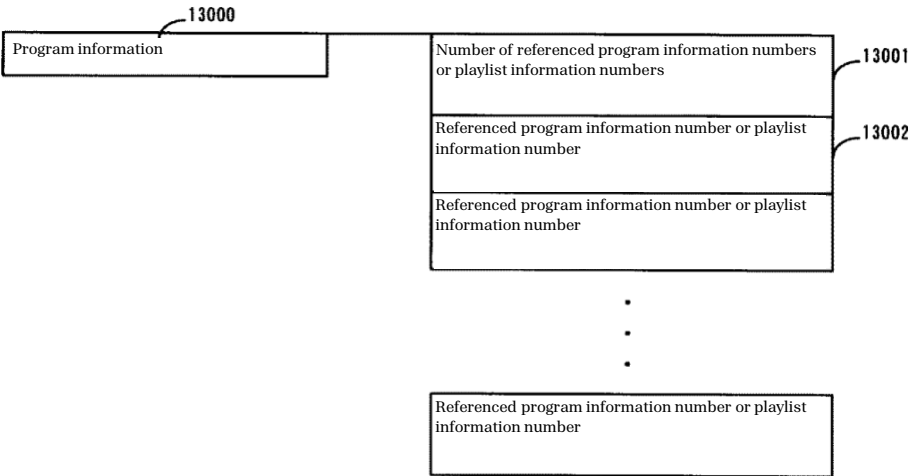


FIG. 13



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|------------------------------------------------|----------------------------------------------------------|
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