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(54) **VEHICLE ENTERTAINMENT SYSTEM UTILITZING PORTABLE MEDIA PLAYER**

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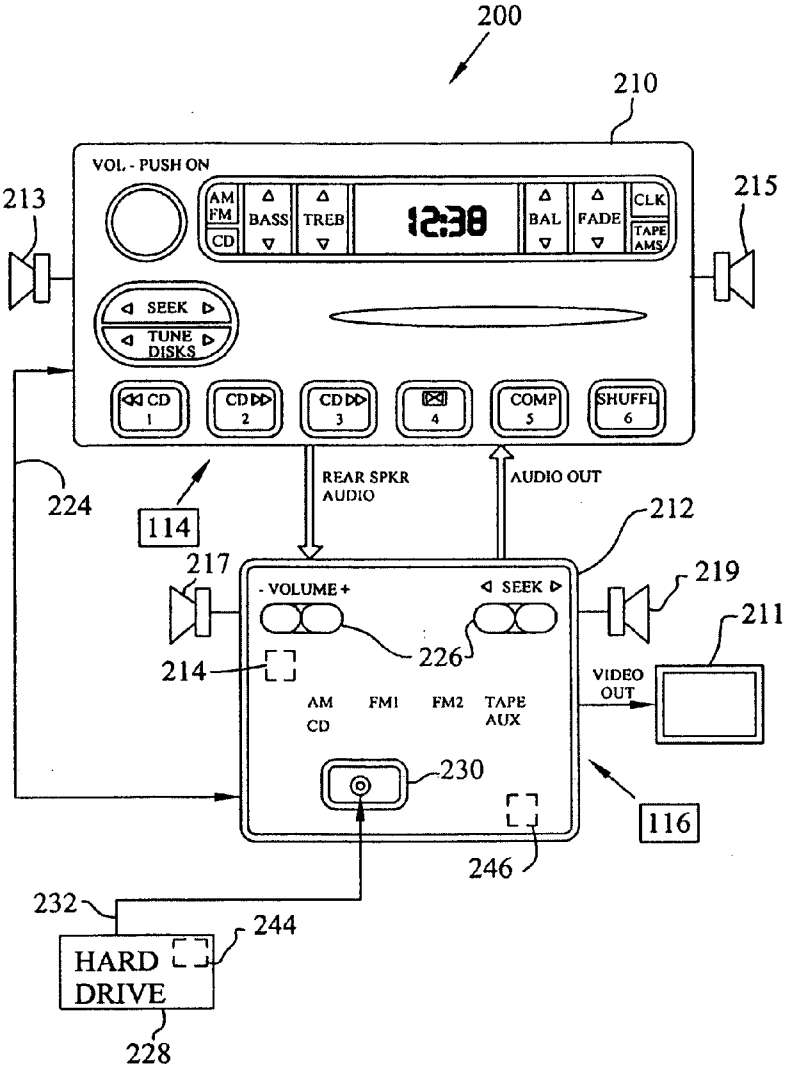
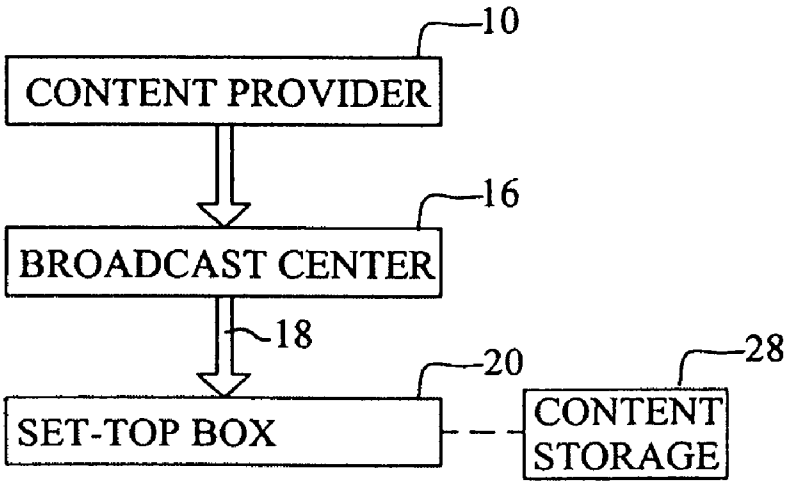
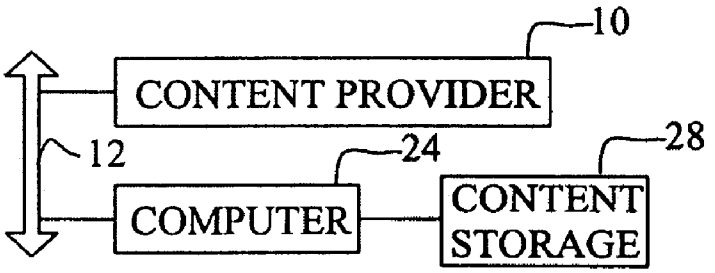
(57) **ABSTRACT**

The present invention provides an entertainment system including a control unit including at least one processor, and at least one portable device adapted to connect to the control unit and to store content, the at least one processor configured to detect the connection of the at least one portable device to the control unit and to automatically locate stored content upon detection of the at least one portable device.

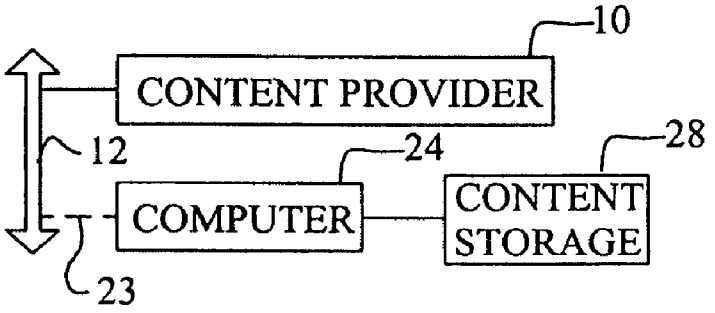



10
CONTENT PROVIDER
16
BROADCAST CENTER
18
20
28
SET-TOP BOX
CONTENT STORAGE

1A


10
CONTENT PROVIDER
12
24
28
COMPUTER
CONTENT STORAGE

1B


10
CONTENT PROVIDER
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CONTENT STORAGE
23

1C

FIG. 1

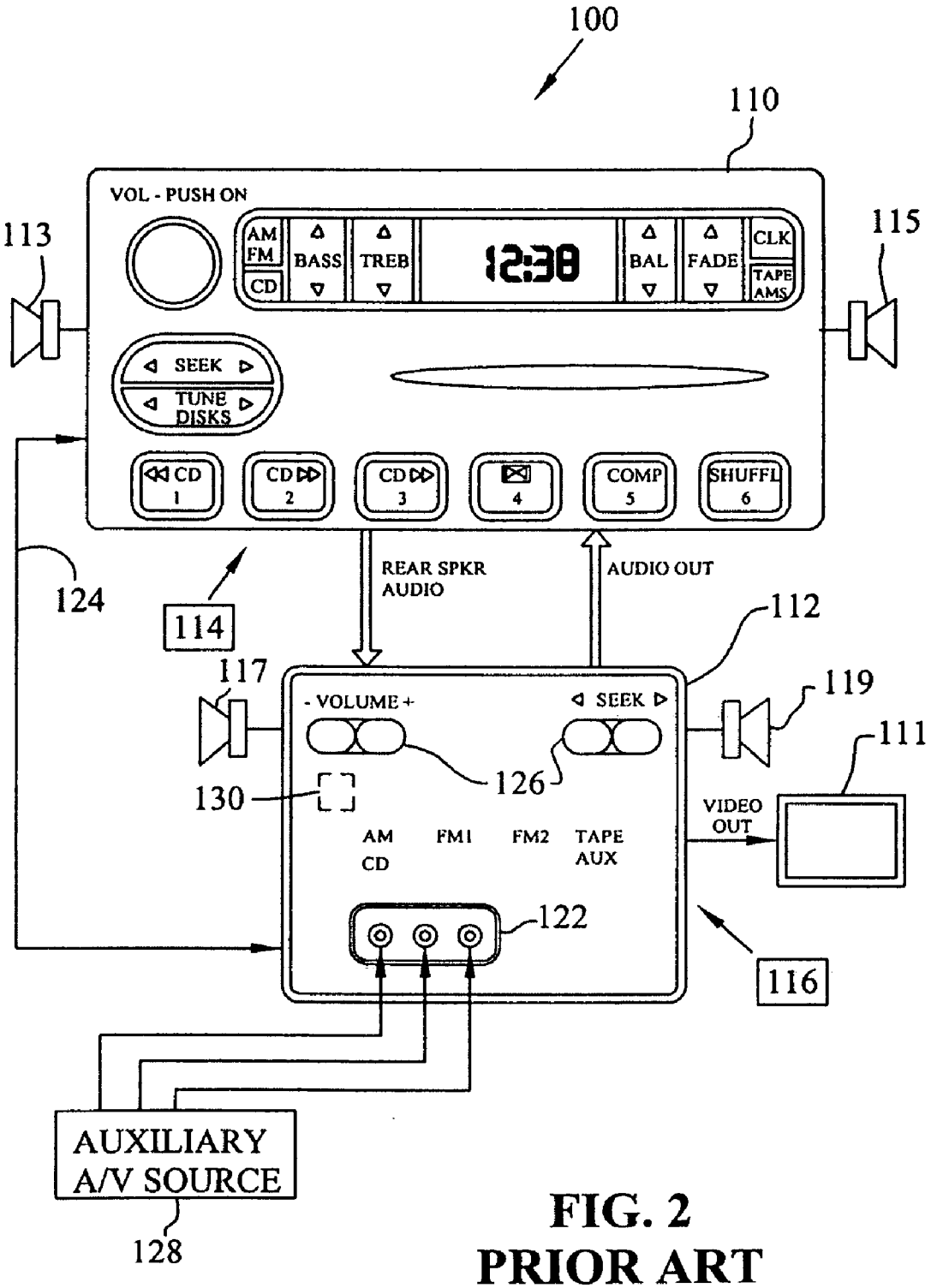


FIG. 2
PRIOR ART

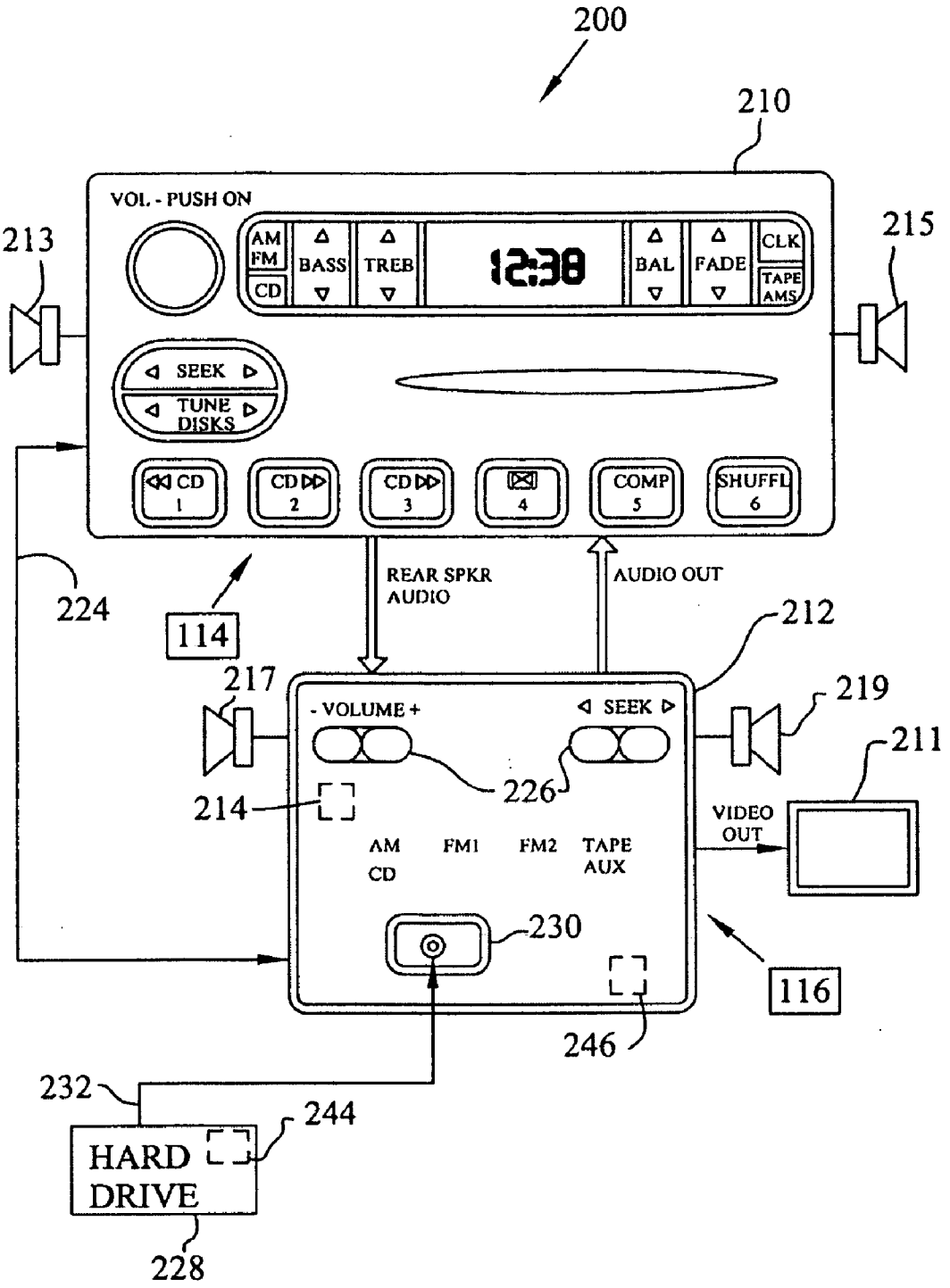

200
210
VOL. - PUSH ON
AM FM
CD
BASS
TREB
12:38
BAL
FADE
CLK
TAPE AMS
213
215
SEEK
TUNE DISKS
CD 1
CD 2
CD 3
4
COMP 5
SHUFFL 6
224
114
REAR SPKR AUDIO
AUDIO OUT
212
217
219
- VOLUME +
SEEK
211
214
226
VIDEO OUT
AM CD
FM1
FM2
TAPE AUX
230
116
246
232
244
HARD DRIVE
228

FIG. 3

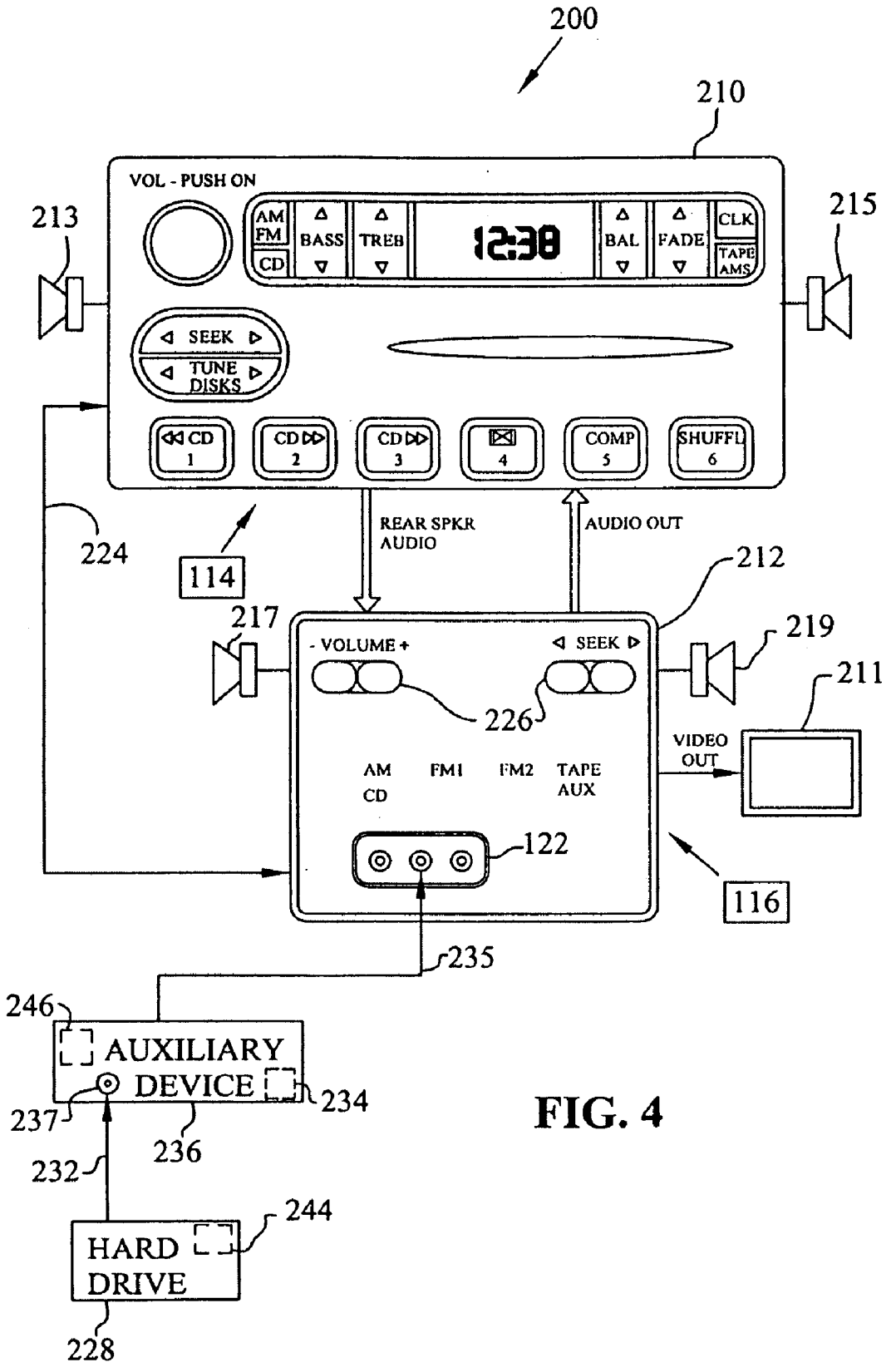
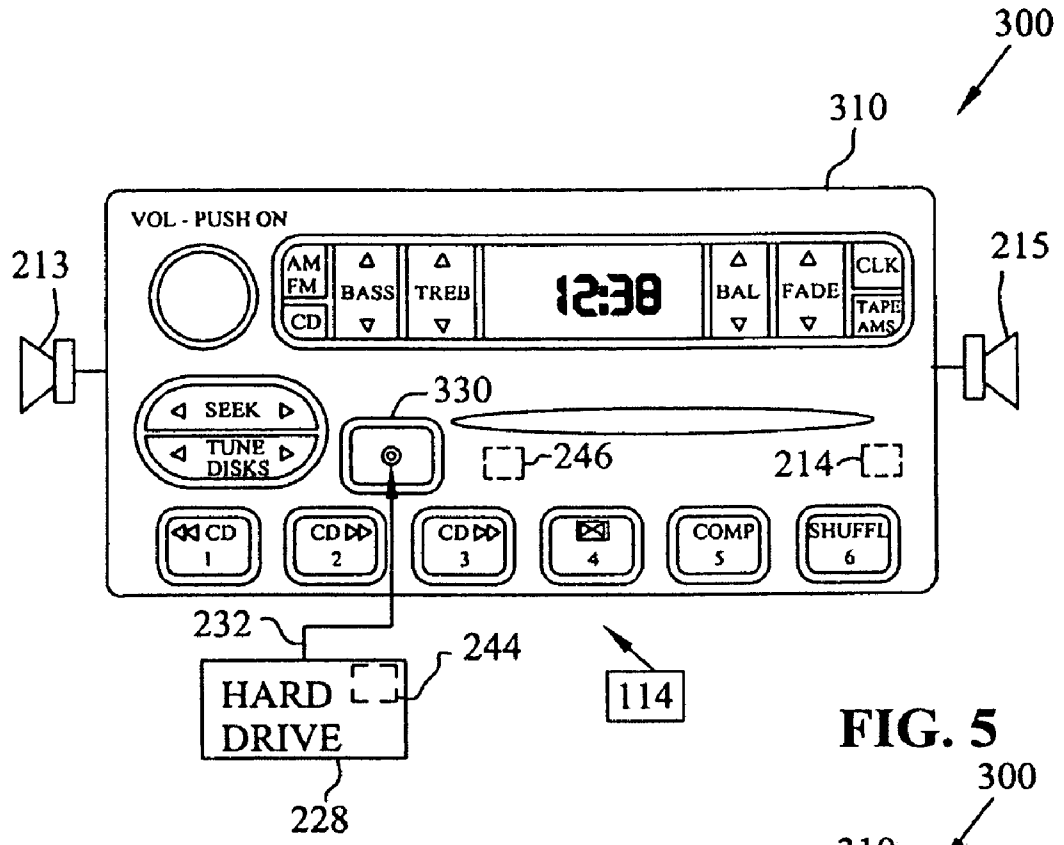

200
210
VOL - PUSH ON
AM FM CD
BASS
TREB
12:38
BAL
FADE
CLK
TAPE AMS
213
215
SEEK
TUNE DISKS
CD 1
CD 2
CD 3
4
COMP 5
SHUFFL 6
224
114
REAR SPKR AUDIO
AUDIO OUT
212
217
219
211
- VOLUME +
SEEK
226
VIDEO OUT
AM CD
FM1
FM2
TAPE AUX
122
116
235
246
AUXILIARY DEVICE
234
237
236
232
244
HARD DRIVE
228

FIG. 4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310
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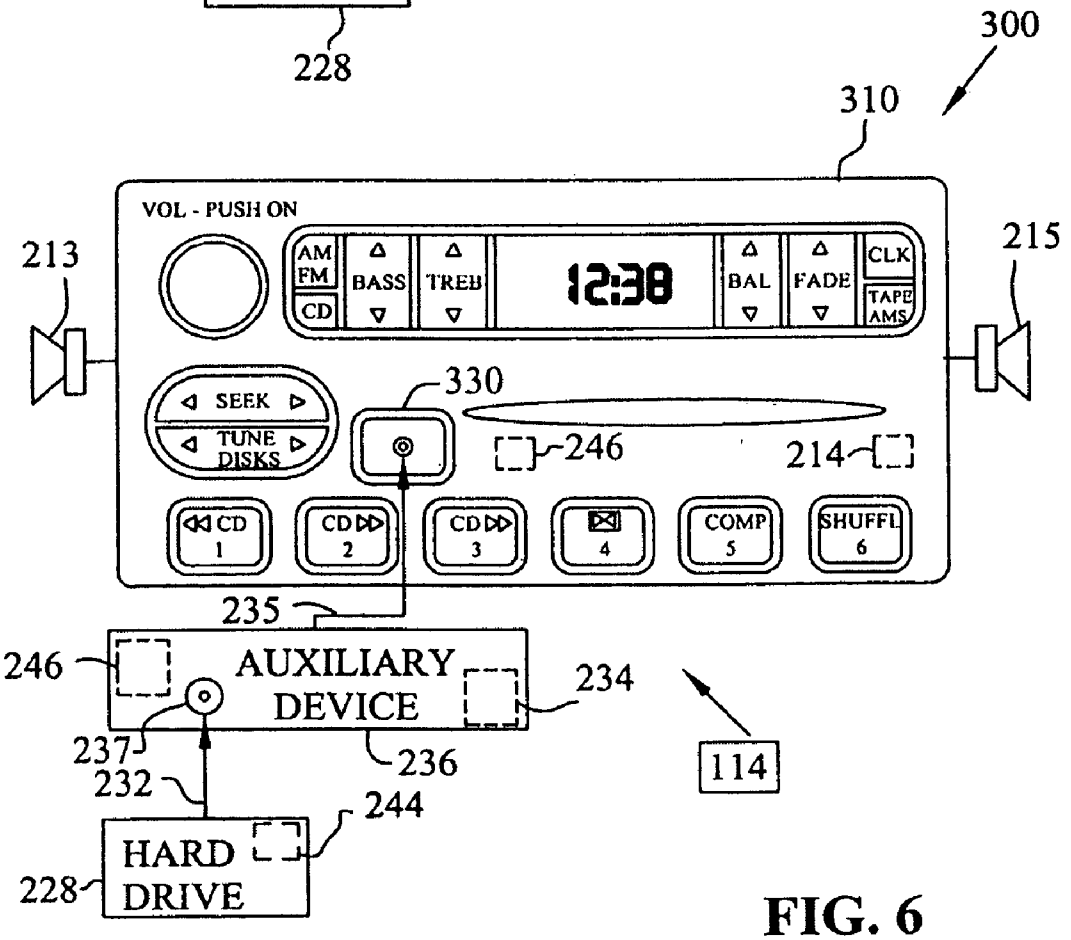
AM FM CD
BASS
TREB
12:38
BAL
FADE
CLK
TAPE AMS
213
215
SEEK
TUNE DISKS
330
246
214
CD 1
CD 2
CD 3
4
COMP 5
SHUFFL 6
232
244
HARD DRIVE
228
114

FIG. 5


300
310
VOL - PUSH ON
AM FM CD
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TREB
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TAPE AMS
213
215
SEEK
TUNE DISKS
330
246
214
CD 1
CD 2
CD 3
4
COMP 5
SHUFFL 6
235
246
AUXILIARY DEVICE
234
237
236
232
244
HARD DRIVE
228
114

FIG. 6

VEHICLE ENTERTAINMENT SYSTEM UTILITZING PORTABLE MEDIA PLAYER

TECHNICAL BACKGROUND

[0001] The present invention generally relates to vehicle rear-seat entertainment systems and more particularly relates to the presentation of video content in such systems.

BACKGROUND OF THE INVENTION

[0002] Today's rear-seat entertainment systems are typically capable of providing entertainment from one or more of the following sources: video cassette tape, digital video disc ("DVD"), television receiver, or auxiliary input (e.g., video game system console, portable DVD player, etc.). While these sources have been sufficient to date, they do not adequately support the presentation of video content that has been delivered via the Internet from newer digital video services or legally recorded with a set-top box. Some services, such as Starz! Ticket™ and MovieLink® allow a subscriber to log into a content portal and download selected movies, music videos and television programs to a personal computer. Additionally, some content providers provide set-top boxes capable of recording content legally.

[0003] A number of portable content players are available that allow downloaded video content to be viewed in a mobile environment independent of a rear-seat entertainment system. However, these devices are expensive and have small viewing screens (i.e., 7.62 cm to 10.16 cm), which reduce their utility. Portable MP3 players are also available for use in a mobile environment, but these devices are only capable of playing back audio content.

SUMMARY OF THE INVENTION

[0004] The present invention provides a mechanism to allow portable content storage devices to be used to playback video data, audio data, audio visual data and/or photo data in a mobile environment. In one form of the present invention an entertainment system includes a control unit including at least one processor, and at least one portable device adapted to connect to the control unit and to store content, the at least one processor configured to detect the connection of the at least one portable device to the control unit and to automatically locate stored content upon detection of the at least one portable device.

[0005] In another form of the present invention an entertainment system includes a control unit, an auxiliary device connected to the control unit and including at least one processor, and at least one portable device connected to the auxiliary device adapted to store content. The at least one processor is configured to detect the connection of the at least one portable device to the auxiliary device and to automatically locate stored content upon detection of the at least one portable device.

[0006] In yet another form of the present invention, a control unit includes at least one processor and a receiver, and at least one portable device is coupled to the control unit and includes a transmitter. The at least one portable device is adapted to store content and to communicate with the control unit over a wireless communication link established between the transmitter and the receiver, and the at least one processor is configured to detect the communication link and to automatically locate stored content upon detection of the communication link.

[0007] In still another form, the present invention includes a rear-seat control unit, an auxiliary device connected to the rear-seat control unit and including at least one processor and a receiver, and at least one portable device coupled to the auxiliary device and having a transmitter, the at least one portable device adapted to store content and to communicate with the auxiliary device over a wireless communication link established between the transmitter and the receiver, the at least one processor configured to detect the communication link and to automatically locate stored content upon detection of the communication link.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] The above-mentioned and other features of this invention, and the manner of attaining them, will become more apparent and the invention itself will be better understood by reference to the following description of embodiments of the invention taken in conjunction with the accompanying drawings, wherein:

[0009] **FIG. 1A** illustrates an example of how the portable hard drive of the present invention receives content;

[0010] **FIG. 1B** illustrates another example of how the portable hard drive of the present invention receives content;

[0011] **FIG. 1C** illustrates yet another example of how the portable hard drive of the present invention receives content;

[0012] **FIG. 2** is a perspective view of a prior art vehicle entertainment system;

[0013] **FIG. 3** is a perspective view of an embodiment of the vehicle entertainment system of the present invention;

[0014] **FIG. 4** is a perspective view of another embodiment of the vehicle entertainment system of the present invention;

[0015] **FIG. 5** is a perspective view of another embodiment of the vehicle entertainment system of the present invention; and

[0016] **FIG. 6** is a perspective view of another embodiment of the vehicle entertainment system of the present invention.

[0017] Corresponding reference characters indicate corresponding parts throughout the several views. Although the drawings represent embodiments of the present invention, the drawings are not necessarily to scale and certain features may be exaggerated in order to better illustrate and explain the present invention.

DESCRIPTION OF THE PRESENT INVENTION

[0018] The embodiments disclosed below are not intended to be exhaustive or limit the invention to the precise forms disclosed in the following detailed description. Rather, the embodiments are chosen and described so that others skilled in the art may utilize their teachings.

[0019] For purposes of the present invention, "content" is hereinafter described as audio data, video data, photo data (e.g., photographs and still video images) and/or audio visual data. Content is stored in the memory of a storage device, which in the exemplary embodiment includes a portable hard drive. However, other types of memory storage devices, volatile and non-volatile, may alternatively be

used, such as memory sticks, optical disks, etc. Portable hard drive players are used to play content stored on portable hard drives. A portable hard drive player appears as a removable hard drive on a personal computer and as a valid storage device for set-top boxes used to receive and record video content from a content provider. Illustrative examples of how portable hard drives receive content are shown in **FIGS. 1A and 1B**.

[0020] In **FIG. 1A**, content provider **10** provides content to broadcast center **16** via satellite, fiber optic cable or digital tape. Broadcast center **16** then broadcasts the content to set-top box **20** over communication channel **18**. Communication channel **18** may include a telephone wire, a digital satellite broadcast, a terrestrial broadcast or a cable television channel (i.e., cable). Set-top box **20** operates as a computer that receives and decodes analog and digital broadcasts. Set-top box **20** includes hard drive **28**, which enables set-top box **20** to record content received from content provider **10** as long as hard drive **28** supports an appropriate level of digital rights management.

[0021] In **FIG. 1B**, content provider **10** makes content available on a web site, and a user of computer **24** downloads the content over a global communication network, e.g., Internet **12**. Hard drive **28** is connected to computer **24** and is used to store the content. The content may be copied to hard drive **28** using a file management program on computer **24** such as Windows Explorer™ or media management programs such as Windows Media Player™, Real Jukebox™ or MusicMatch™. Alternatively, as shown in **FIG. 1C**, portable computer **24** with a wireless connection **23** to Internet **12** may be used to download content while in the mobile environment.

[0022] In **FIGS. 1A, 1B** and 1C, hard drive **28** may be integrated with set-top box **20** and computer **24**, respectively, but in an exemplary embodiment of the present invention, hard drive **28** is portable and embodied in a portable content player, e.g., Apple Inc.'s iPOD® (is a registered trademark of Apple Computer, Inc. of Cupertino, Calif.). Accordingly, portable hard drive **228** (**FIGS. 3 and 4**) is connected to set-top box **20**/computer **24** and used to move content between set-top box **20**/computer **24** and other computers, much as can be done with floppy disks, multimedia cards, or universal serial bus flash memory devices.

[0023] The use of portable hard drive **228** enables content stored therein to be viewed in a mobile environment, such as in a vehicle. **FIG. 2** shows a prior art vehicle entertainment system **100** for use in a vehicle. Vehicle entertainment system **100** includes front control unit **110** and a remote control unit **112**. Front control unit **110** is mounted for use by a user in front seat area **114** of the vehicle, and remote control unit **112** may be mounted anywhere in the vehicle. Front seat area **114** refers to the area in the vehicle in which a front seat passenger is able to comfortably and readily manipulate the controls of front control unit **110**. Rear seat area **116** includes any area in a vehicle in which a rear seat passenger is able to manipulate the controls of remote control unit **112**.

[0024] The provision of front control unit **110** enables a vehicle to be produced either with or without the audio and video functions of remote control unit **112**. Left front vehicle speaker **113** and right front vehicle speaker **115** are connected to front control unit **110**. Front control unit **110** is in communication with remote control unit **112** via network **142**, e.g., a J1850 or a controller area network.

[0025] Remote control unit **112** is provided to enhance the entertainment experience of a vehicle's passengers. For example, if remote control unit **112** is positioned in rear seat area **116** of the vehicle, remote control unit enhances the entertainment experience of a vehicle's rear-seat passengers. Remote control unit **112** includes one or more microprocessors **130**, volume and seek controls **126**, and connector port **122** for connecting to auxiliary audio/video source **128**, such as a video game player, a portable DVD player or a camcorder. Connected to remote control unit **112** are left rear speaker **117**, right rear speaker **119** and video screen **111**.

[0026] One embodiment of the vehicle entertainment system of the present invention is shown in **FIG. 3**. Similar to the system shown in **FIG. 2**, vehicle entertainment system **200** includes front control unit **210** and remote control unit **212**. In an exemplary embodiment of the present invention, remote control unit **212** is a rear-seat control unit. A "rear-seat control unit" is herein defined as a control unit designed to fit in the rear seat area of the vehicle. A rear-seat control unit may be smaller in dimension (i.e. height, width and length) than front control unit **110** so that it fits within rear seat area **116** of the vehicle. For example, rear seat area **116** may include remote control unit **112** positioned between the front driver and front passenger seats, control unit **112** positioned between the rear passenger seats and/or control unit **112** mounted in the ceiling of the vehicle.

[0027] Remote control unit **212** includes one or more microprocessors **214** and communicates with front control unit **210** over communication network **224**. Remote control unit **212** includes volume and seek controls **226** as well as connector port **230**. Rear speakers **217**, **219** are coupled to remote control unit **212** and enables control unit **212** to present the stored audio data to the vehicle's passengers. Similarly, video monitor **211** is coupled to remote control unit **212** and enables stored video data to be presented to the vehicle's passengers.

[0028] Connector port **230** is adapted to enable portable hard drive **228** to connect to remote control unit **212** through communication interface **232**. In an exemplary embodiment of the present invention, communication interface **232** is a cable utilizing one of an universal serial bus, a FireWire® (FIREWIRE is a registered trademark of Apple Computer, Inc. of Cupertino, Calif.), an IEEE 1394, an i.Link® (I.LINK is a registered trademark of Sony Corporation of Tokyo, Japan), or any other communication standard suitable for transferring content. Multiple connector ports **230** may be provided to enable multiple portable hard drives **228** and/or other portable electronic devices to connect to remote control unit **212**.

[0029] In other embodiments of system **200**, portable hard drive **228** may communicate with remote control unit **212** using a short range wireless radio-frequency ("RF") technology. The most notable of these technologies include 802.11, Bluetooth and Home RF. If such a wireless technology is used, hard drive **228** may include a RF transmitter **244** and hardware configured to transmit content, and remote control unit **212** may include a receiver **246** and hardware configured to receive the transmitted content.

[0030] In accordance with system **200** of **FIG. 3**, once content is stored to portable hard drive **228**, hard drive **228**

may be taken to a vehicle and plugged into connector port **230**. In an exemplary embodiment of the present invention, microprocessor **214** of remote control unit **212** is programmed to detect that portable hard drive **228** has been connected to remote control unit **212**. In other embodiments of the present invention, microprocessor **214** is programmed to detect whether a RF communication link has been established between portable hard drive **228** and remote control unit **212**. In still other embodiments of the present invention, microprocessor **214** is programmed to detect both a physically connected portable hard drive **228** and a RF-connected hard drive **228**. If multiple hard drives **228** and/or other portable electronic devices have been connected to remote control unit **212** either by communication interface **232** or by RF communication link, microprocessor **214** detects the connection of each hard drive **228** and/or electronic device.

[**0031**] Microprocessor **214** is also programmed to scan one or more hard drives **228** and/or other electronic devices connected to remote control unit **212** to locate content. Multiple processors may be used to carry out this function. For example, a first microprocessor may be programmed to locate audio data files stored in the WAVE, MP3 or other known audio formats. A second microprocessor may be used to locate audio visual data files stored in the Audio Video Interleave or other known audio visual formats. A third microprocessor may be used to locate video data files stored in the MPEG-2, Motion JPEG and other known video formats, and a fourth microprocessor may be used to locate and decode photo data files stored in the JPEG and other known image formats. In other embodiments of the present invention, microprocessor **214** is programmed to locate content stored in predetermined locations on portable hard drive **228**, for example, in a specified "audio" or "video" content files.

[**0032**] Microprocessor **214** is further programmed to check appropriate rights management authorizations and to retrieve, decode and present the located content to the user of remote control unit **212** via speakers **213**, **215**, **217**, **219** and/or video screen **211**.

[**0033**] Another embodiment of the present invention is shown in **FIG. 4**. In this rear-seat entertainment system **200**, remote control unit **212** includes audio/video inputs **122**, e.g., RCA jacks. Auxiliary connector **235**, e.g., a RCA cord, connects auxiliary device **236** to audio/video inputs **122**. Auxiliary device **236** includes one or more microprocessors **234** and one or more connector ports **237**. In an exemplary embodiment of the present invention, portable hard drive **228** connects to auxiliary device **236** via communication interface **232** and connector port **237**. In other embodiments of the present invention, hard drive **228** may include RF transmitter **244** and hardware configured to wirelessly transmit content, and auxiliary device may include receiver **246** and hardware configured to receive the transmitted content.

[**0034**] When one or more hard drives **228** and/or other electronic devices are connected to auxiliary device **236**, microprocessor **234** is programmed to recognize that hard drives **228** have been connected and to scan hard drives **228** for content stored in the format(s) that microprocessor **234** is programmed to decode. In other embodiments of the present invention, microprocessor **234** is programmed to detect whether a RF communication link has been established between portable hard drive **228** and auxiliary device **236**. Once microprocessor **234** locates the content, microprocessor **234** checks appropriate rights management authorizations and retrieves, decodes and presents the content for presentation to the end user by way of speakers **213**, **215**, **217**, **219** and/or video screen **211**.

[**0035**] In other embodiments of the present invention, hard drive **228** may connected to front control unit **310** positioned in front seat area **114** of the vehicle (**FIG. 5**), or to auxiliary device **237** (**FIG. 6**) coupled to front control unit **310**. In both instances, hard drive **228** operates with front control unit **310** in the same way as hard drive **228** has been described herein as operating with remote control unit **212**.

[**0036**] While this invention has been described as having an exemplary design, the present invention may be further modified within the spirit and scope of this disclosure. This application is therefore intended to cover any variations, uses, or adaptations of the invention using its general principles. Further, this application is intended to cover such departures from the present disclosure as come within known or customary practice in the art to which this invention pertains.

We claim:

1. An entertainment system comprising:

a control unit including at least one processor; and

at least one portable device adapted to connect to said control unit and to store content, said at least one processor configured to detect the connection of said at least one portable device to said control unit and to automatically locate stored content upon detection of said at least one portable device.

2. The entertainment system of claim 1 wherein said at least one processor is configured to decode the stored content.

3. The entertainment system of claim 1 wherein said at least one portable device is configured to store content including audio data.

4. The entertainment system of claim 1 wherein said at least one portable device is configured to store content including video data.

5. The entertainment system of claim 1 where said at least one portable device is configured to store content including photo data.

6. The entertainment system of claim 1 wherein said control unit is configured to mount in one of the front seat area and the rear seat area of a vehicle.

7. An entertainment system comprising:

a control unit;

an auxiliary device connected to said control unit and including at least one processor; and

at least one portable device connected to said auxiliary device and adapted to store content, said at least one processor configured to detect the connection of said at least one portable device to said auxiliary device and to automatically locate stored content upon detection of said at least one portable device.

8. The entertainment system of claim 7 wherein said at least one portable device is configured to store content that includes audio data.

9. The entertainment system of claim 7 wherein said at least one portable device is configured to store content that includes video data.

10. The entertainment system of claim 7 wherein said at least one portable device is configured to store content that includes photo data.

11. The entertainment system of claim 7 wherein said control unit is configured to mount in one of the front seat area and the rear seat area of a vehicle.

12. The entertainment system of claim 7 wherein said at least one processor is configured to decode the content.

13. An entertainment system comprising:

a control unit including at least one processor and a receiver; and

at least one portable device coupled to said control unit and including a transmitter, said at least one portable device adapted to store content and to communicate with said control unit over a wireless communication link established between said transmitter and said receiver, said at least one processor configured to detect the communication link and to automatically locate stored content upon detection of the communication link.

14. The entertainment system of claim 13 wherein said at least one processor is configured to decode the content.

15. The entertainment system of claim 13 wherein said at least one portable device is configured to store content that includes audio data.

16. The entertainment system of claim 13 wherein said at least one portable device is configured to store content that includes video data.

17. An entertainment system comprising:

a rear-seat control unit;

an auxiliary device connected to said rear-seat control unit and including at least one processor and a receiver; and

at least one portable device coupled to said auxiliary device and having a transmitter, said at least one portable device adapted to store content and to communicate with said auxiliary device over a wireless communication link established between said transmitter and said receiver, said at least one processor configured to detect the communication link and to automatically locate stored content upon detection of the communication link.

18. The entertainment system of claim 17 wherein said at least one processor is configured to decode the content.

19. The entertainment system of claim 17 wherein said at least one portable device is configured to store content that includes audio data.

20. The entertainment system of claim 17 wherein said at least one portable device is configured to store content that includes video data.

* * * * *