IN THE UNITED STATES DISTRICT COURT

FOR THE NORTHERN DISTI

06CV2703
JUDGE KENNELLY
MAGISTRATE COLE

ROWE INTERNATIONAL CORP. and ARACHNID, INC.,

Plaintiffs,

v.

ECAST, INC., ROCK-OLA MANUFACTURING CORP., and VIEW INTERACTIVE ENTERTAINMENT CORP.,

Defendants.

COMPLAINT

AND REQUEST FOR JURY TRIAL

FILED
MAY 15 2006
MICHAEL W. DOBBINS
CLERK, U.S. DISTRICT COURT

COMPLAINT

Plaintiffs, Rowe International Corp., ("Rowe") and Arachnid, Inc. ("Arachnid" and "Plaintiffs," collectively), file this Complaint against Defendants Ecast, Inc. ("Ecast"), Rock-Ola Manufacturing Corp. ("Rock-Ola"), and View Interactive Entertainment Corp. ("View" and "Defendants," collectively), and allege as follows:

The Parties

1. Rowe is a corporation organized under the laws of Delaware and maintaining its principal place of business at 1500 Union S.E., Grand Rapids, MI 49507-1884.

2. Arachnid is a corporation organized under the laws of Ohio, and maintaining its principal place of business at 6212 Material Ave., Loves Park, IL 61111.

3. Upon information and belief, Ecast is a corporation organized under the laws of the State of California, with a principal place of business at 49 Geary

Street, Mezzanine, San Francisco, CA 94108, and conducts business in this judicial district including performing acts of infringement as alleged herein.

4. Upon information and belief, Rock-Ola Manufacturing Corp. is a corporation organized under the laws of the state of Illinois, with a principal place of business at 2335 W. 208th St., Torrance, California 90501, and conducts business in this judicial district including performing acts of infringement as alleged herein.

5. Upon information and belief, View Interactive Entertainment Corp. is a corporation organized under the laws of the state of California, with a principal place of business at 2065 W. Ave. 140, Suite B, San Leandro, California 94577, and conducts business in this judicial district including performing acts of infringement as alleged herein.

Nature of Action and Jurisdiction

6. This cause of action arises under the Patent laws of the United States, Title 35, United States Code, and more particularly under 35 U.S.C. §§ 271 et seq. This Court has jurisdiction over this patent infringement action under the Judicial Code of the United States, 28 U.S.C. §§ 1338(a) and 1331.

7. Upon information and belief, Defendants have engaged in business activity and infringing activity within this judicial district sufficient to vest this Court with personal jurisdiction over Defendants.

Venue

8. Venue is proper in this district pursuant to 28 U.S.C. §§ 1391(b) and (c) and 28 U.S.C. § 1400(b) in that Defendants are corporations residing in this judicial district and a substantial part of the events giving rise to these claims has occurred in this judicial district. Defendants also have committed acts in this judicial district that

are accused to be direct and/or indirect infringement, contributory infringement and inducement of infringement of the patents-in-suit.

FACTUAL BACKGROUND

9. By assignment, Arachnid owns a series of patents related to computer jukeboxes, including U.S. Patent Nos.: 5,355,302 (issued on October 11, 1994); 5,781,889 (issued on July 14, 1998); 5,848,398 (issued on December 8, 1998); 6,397,189 (issued on May 28, 2002); 6,381,575 (issued on April 30, 2002); and 6,970,834 (issued on November 29, 2005) (collectively referred to herein as "the Arachnid patents"). Each of the Arachnid patents was duly and legally issued by the U.S. Patent and Trademark Office in the name of John Martin and sometimes others; and each is assigned to Arachnid. A copy of each patent is attached hereto as Exhibits A-F.

10. The Arachnid patents are directed toward improved computer jukeboxes, jukebox management stations, and computer jukebox networks.

11. On October 28, 2003, Rowe entered into an agreement with Arachnid to exclusively license the Arachnid patents ("the Arachnid license"). Under the terms of this agreement, Rowe received rights in the Arachnid patents that were held by Arachnid, including the right to sue for infringement and collect damages therefore.

12. Rowe has given Defendants Ecast and Rock-Ola actual notice of the Arachnid patents and that Defendants' products and activities infringe claims of the Arachnid patents. On information and belief, Defendant View also has actual notice of the Arachnid patents.

13. On July 22, 2003, the U.S. Patent and Trademark Office duly and legally issued U.S. Patent No. 6,598,230 (the "'230 patent") in the name of Karsten

Ballhorn for his invention titled "MULTIMEDIA BOX NETWORK." A copy of the '230 patent is attached hereto as Exhibit G. The '230 patent is directed to a jukebox network including a device for the remote management of a jukebox.

14. By assignment, NSM Music Group Ltd. ("NSM") is the owner of the '230 patent. On or about July 7, 2005, Rowe entered into an agreement with NSM to exclusively license the '230 patent ("the NSM license"). Under the terms of the agreement, Rowe has the sole right to sue and recover damages for infringement of the '230 patent.

15. On information and belief, Defendants had actual notice of the '230 patent and that Defendants' products infringe the '230 patent.

16. On information and belief, Ecast uses, has used, sells, has sold, services, has serviced, offers and has offered to sell and/or has induced others to offer to sell or sell, manufacture or use digital jukeboxes and/or jukebox components for digital jukeboxes, as well as a jukebox upgrade kit. In addition, Ecast owns and operates a central server system ("the Ecast system") that communicates with and operates in conjunction with a network of digital jukeboxes and the jukebox operators (these products and system are "the Ecast products," collectively).

17. On information and belief, Rock-Ola uses, has used, sells, has sold, services, has serviced, offers and has offered to sell and/or has induced others to offer to sell or sell, manufacture or use digital jukeboxes and/or jukebox components for digital jukeboxes ("the Rock-ola products," collectively) for use in the Ecast system.

18. On information and belief, View uses, has used, sells, has sold, services, has serviced, offers and has offered to sell and/or has induced others to offer to sell or sell, manufacture or use digital jukeboxes and/or jukebox components for digital

jukeboxes, as well as a jukebox upgrade kit ("the View products," collectively) for use in the Ecast system.

19. Pursuant to 35 U.S.C. § 282, each of the Arachnid patents and the '230 patent, including each and every claim therein, are presumed valid.

PATENT INFRINGEMENT COUNT I

20. Plaintiffs Rowe and Arachnid repeat and reallege the allegations set forth in paragraphs 1 through 19.

21. Defendants have been and are now infringing U.S. Patent No. 5,355,302 (the "'302 patent") by making, using, selling, offering for sale, use and/or importation in the United States, systems and products covered by one or more claims of the '302 patent.

22. Defendants have contributorily infringed, and continue to contributorily infringe the '302 patent by selling, offering to sell and/or import in the United States components and/or materials covered by one or more claims of the '302 patent, wherein such components and/or materials constitute a material part of the invention. Defendants have done so and continue to do so knowing that the components and/or materials are especially made or especially adapted for use in infringement of the '302 patent, and are not a staple article suitable for substantial non-infringing use.

23. Defendants have induced infringement, and Defendants continue to induce infringement of the '302 patent by, among other things, their advertising, offering and providing of services, as well as instructing, directing and/or advising others as to how to carry out an infringement of the '302 patent.

24. Upon information and belief, Defendants had actual knowledge of the '302 patent at the time they were infringing, inducing infringement of, and contributorily infringing the '302 patent. Notwithstanding that actual knowledge, Defendants continued to infringe, induce others to infringe, and contributorily infringe the '302 patent.

25. Defendants' acts of infringement, inducement of infringement and contributory infringement have been made with full knowledge of the '302 patent. Such acts constitute willful and deliberate infringement, entitling Rowe and Arachnid to enhanced damages and attorney fees.

26. As a consequence of Defendants' infringement, Rowe and/or Arachnid have been irreparably damaged, to an extent not yet determined, and will continue to be irreparably damaged by such acts in the future unless Defendants are enjoined by this Court from committing further acts of infringement.

27. Rowe and Arachnid are entitled to recover damages adequate to compensate for Defendants' infringement, which in no event can be less than a reasonable royalty.

PATENT INFRINGEMENT COUNT II

28. Plaintiffs Rowe and Arachnid repeat and reallege the allegations set forth in paragraphs 1 through 27.

29. Defendants have been and are now infringing U.S. Patent No. 5,781,889 (the "'889 patent") by making, using, selling, offering for sale, use and/or importation in the United States, systems and products covered by one or more claims of the '889 patent.

30. Defendants have contributorily infringed, and continue to contributorily infringe the '889 patent by selling, offering to sell and/or import in the United States components and/or materials covered by one or more claims of the '889 patent, wherein such components and/or materials constitute a material part of the invention. Defendants have done so and continue to do so knowing that the components and/or materials are especially made or especially adapted for use in infringement of the '889 patent, and are not a staple article suitable for substantial non-infringing use.

31. Defendants have induced infringement, and Defendants continue to induce infringement of the '889 patent by, among other things, their advertising, offering and providing of services, as well as instructing, directing and/or advising others as to how to carry out an infringement of the '889 patent.

32. Upon information and belief, Defendants had actual knowledge of the '889 patent at the time they were infringing, inducing infringement of, and contributorily infringing the '889 patent. Notwithstanding that actual knowledge, Defendants continued to infringe, induce others to infringe, and contributorily infringe the '889 patent.

33. Defendants' acts of infringement, inducement of infringement and contributory infringement have been made with full knowledge of the '889 patent. Such acts constitute willful and deliberate infringement, entitling Rowe and Arachnid to enhanced damages and attorney fees.

34. As a consequence of Defendants' infringement, Rowe and/or Arachnid have been irreparably damaged, to an extent not yet determined, and will

continue to be irreparably damaged by such acts in the future unless Defendants are enjoined by this Court from committing further acts of infringement.

35. Rowe and Arachnid are entitled to recover damages adequate to compensate for Defendants' infringement, which in no event can be less than a reasonable royalty.

PATENT INFRINGEMENT COUNT III

36. Plaintiffs Rowe and Arachnid repeat and reallege the allegations set forth in paragraphs 1 through 35.

37. Defendants have been and are now infringing U.S. Patent No. 5,848,398 (the "'398 patent") by making, using, selling, offering for sale, use and/or importation in the United States, systems and products covered by one or more claims of the '398 patent.

38. Defendants have contributorily infringed, and continue to contributorily infringe the '398 patent by selling, offering to sell and/or import in the United States components and/or materials covered by one or more claims of the '398 patent, wherein such components and/or materials constitute a material part of the invention. Defendants have done so and continue to do so knowing that the components and/or materials are especially made or especially adapted for use in infringement of the '398 patent, and are not a staple article suitable for substantial non-infringing use.

39. Defendants have induced infringement, and Defendants continue to induce infringement of the '398 patent by, among other things, their advertising, offering and providing of services, as well as instructing, directing and/or advising others as to how to carry out a direct infringement of the '398 patent.

40. Upon information and belief, Defendants had actual knowledge of the '398 patent at the time they were infringing, inducing infringement of, and contributorily infringing the '398 patent. Notwithstanding that actual knowledge, Defendants continued to infringe, induce others to infringe, and contributorily infringe the '398 patent.

41. Defendants' acts of infringement, inducement of infringement and contributory infringement have been made with full knowledge of the '398 patent. Such acts constitute willful and deliberate infringement, entitling Rowe and Arachnid to enhanced damages and attorney fees.

42. As a consequence of Defendants' infringement, Rowe and/or Arachnid have been irreparably damaged, to an extent not yet determined, and will continue to be irreparably damaged by such acts in the future unless Defendants are enjoined by this Court from committing further acts of infringement.

43. Rowe and Arachnid are entitled to recover damages adequate to compensate for Defendants' infringement, which in no event can be less than a reasonable royalty.

PATENT INFRINGEMENT COUNT IV

44. Plaintiffs Rowe and Arachnid repeat and reallege the allegations set forth in paragraphs 1 through 43.

45. Defendants have been and are now infringing U.S. Patent No. 6,397,189 (the "'189 patent") by making, using, selling, offering for sale, use and/or importation in the United States, systems and products covered by one or more claims of the '189 patent.

46. Defendants have contributorily infringed, and continue to contributorily infringe the '189 patent by selling, offering to sell and/or import in the United States components and/or materials covered by one or more claims of the '189 patent, wherein such components and/or materials constitute a material part of the invention. Defendants have done so and continue to do so knowing that the components and/or materials are especially made or especially adapted for use in infringement of the '189 patent, and are not a staple article suitable for substantial non-infringing use.

47. Defendants have induced infringement, and Defendants continue to induce infringement of the '189 patent by, among other things, their advertising, offering and providing of services, as well as instructing, directing and/or advising others as to how to carry out an infringement of the '189 patent.

48. Upon information and belief, Defendants had actual knowledge of the '189 patent at the time they were infringing, inducing infringement of, and contributorily infringing the '189 patent. Notwithstanding that actual knowledge, Defendants continued to infringe, induce others to infringe, and contributorily infringe the '189 patent.

49. Defendants' acts of infringement, inducement of infringement and contributory infringement have been made with full knowledge of the '189 patent. Such acts constitute willful and deliberate infringement, entitling Rowe and Arachnid to enhanced damages and attorney fees.

50. As a consequence of Defendants' infringement, Rowe and/or Arachnid have been irreparably damaged, to an extent not yet determined, and will

continue to be irreparably damaged by such acts in the future unless Defendants are enjoined by this Court from committing further acts of infringement.

51. Rowe and Arachnid are entitled to recover damages adequate to compensate for Defendants' infringement, which in no event can be less than a reasonable royalty.

PATENT INFRINGEMENT COUNT V

52. Plaintiffs Rowe and Arachnid repeat and reallege the allegations set forth in paragraphs 1 through 51.

53. Defendants have been and are now infringing U.S. Patent No. 6,381,575 (the "'575 patent") by making, using, selling, offering for sale, use and/or importation in the United States, systems and products covered by one or more claims of the '575 patent.

54. Defendants have contributorily infringed, and continue to contributorily infringe the '575 patent by selling, offering to sell and/or import in the United States components and/or materials covered by one or more claims of the '575 patent, wherein such components and/or materials constitute a material part of the invention. Defendants have done so and continue to do so knowing that the components and/or materials are especially made or especially adapted for use in infringement of the '575 patent, and are not a staple article suitable for substantial non-infringing use.

55. Defendants have induced infringement, and Defendants continue to induce infringement of the '575 patent by, among other things, their advertising,

offering and providing of services, as well as instructing, directing and/or advising others as to how to carry out an infringement of the '575 patent.

56. Upon information and belief, Defendants had actual knowledge of the '575 patent at the time they were infringing, inducing infringement of, and contributorily infringing the '575 patent. Notwithstanding that actual knowledge, Defendants continued to infringe, induce others to infringe, and contributorily infringe the '575 patent.

57. Defendants' acts of infringement, inducement of infringement and contributory infringement have been made with full knowledge of the '575 patent. Such acts constitute willful and deliberate infringement, entitling Rowe and Arachnid to enhanced damages and attorney fees.

58. As a consequence of Defendants' infringement, Rowe and/or Arachnid have been irreparably damaged, to an extent not yet determined, and will continue to be irreparably damaged by such acts in the future unless Defendants are enjoined by this Court from committing further acts of infringement.

59. Rowe and Arachnid are entitled to recover damages adequate to compensate for Defendants' infringement, which in no event can be less than a reasonable royalty.

PATENT INFRINGEMENT COUNT VI

60. Plaintiffs Rowe and Arachnid repeat and reallege the allegations set forth in paragraphs 1 through 59.

61. Defendants have been and are now infringing U.S. Patent No. 6,970,834 (the "'834 patent") by making, using, selling, offering for sale, use and/or

importation in the United States, systems and products covered by one or more claims of the '834 patent.

62. Defendants have contributorily infringed, and continue to contributorily infringe the '834 patent by selling, offering to sell and/or import in the United States components and/or materials covered by one or more claims of the '834 patent, wherein such components and/or materials constitute a material part of the invention. Defendants have done so and continue to do so knowing that the components and/or materials are especially made or especially adapted for use in infringement of the '834 patent, and are not a staple article suitable for substantial non-infringing use.

63. Defendants have induced infringement, and Defendants continue to induce infringement of the '834 patent by, among other things, their advertising, offering and providing of services, as well as instructing, directing and/or advising others as to how to carry out an infringement of the '834 patent.

64. Upon information and belief, Defendants had actual knowledge of the '834 patent at the time they were infringing, inducing infringement of, and contributorily infringing the '834 patent. Notwithstanding that actual knowledge, Defendants continued to infringe, induce others to infringe, and contributorily infringe the '834 patent.

65. Defendants' acts of infringement, inducement of infringement and contributory infringement have been made with full knowledge of the '834 patent. Such acts constitute willful and deliberate infringement, entitling Rowe and Arachnid to enhanced damages and attorney fees.

66. As a consequence of Defendants' infringement, Rowe and/or Arachnid have been irreparably damaged, to an extent not yet determined, and will continue to be irreparably damaged by such acts in the future unless Defendants are enjoined by this Court from committing further acts of infringement.

67. Rowe and Arachnid are entitled to recover damages adequate to compensate for Defendants' infringement, which in no event can be less than a reasonable royalty.

PATENT INFRINGEMENT COUNT VII

68. Plaintiff Rowe repeats and realleges the allegations set forth in paragraphs 1 through 67.

69. Defendants have been and are now infringing the '230 patent by making, using, selling, offering for sale, use and/or importation in the United States, systems and products covered by one or more claims of the '230 patent.

70. Defendants have contributorily infringed, and continue to contributorily infringe the '230 patent by selling, offering to sell and/or import in the United States components and/or materials covered by one or more claims of the '230 patent, wherein such components and/or materials constitute a material part of the invention. Defendants have done so and continue to do so knowing that the components and/or materials are especially made or especially adapted for use in infringement of the '230 patent, and are not a staple article suitable for substantial non-infringing use.

71. Defendants have induced infringement, and continue to induce infringement of the '230 patent by, among other things, their advertising, offering and

providing of services, as well as instructing, directing and/or advising others as to how to carry out a direct infringement of the '230 patent.

72. Upon information and belief, Defendants had actual knowledge of the '230 patent at the time they were infringing, inducing infringement of, and contributorily infringing the '230 patent. Notwithstanding that actual knowledge, Defendants have continued to infringe, induce others to infringe, and contributorily infringe the '230 patent.

73. Defendants' acts of infringement, inducement of infringement and contributory infringement have been made with full knowledge of the '230 patent. Such acts constitute willful and deliberate infringement, entitling Rowe to enhanced damages and attorney fees.

74. As a consequence of Defendants' infringement, Rowe has been irreparably damaged to an extent not yet determined, and Rowe will continue to be irreparably damaged by such acts in the future unless Defendants are enjoined by this Court from committing further acts of infringement.

75. Rowe is entitled to recover damages adequate to compensate for Defendants' infringement, which in no event can be less than a reasonable royalty.

PRAYER FOR RELIEF

Wherefore, Rowe and Arachnid pray for entry of judgment declaring:

A. that Defendants have infringed, contributorily infringed and/or induced infringement, and that by their actions will continue to infringe, contributorily infringe and/or induce infringement of the '302 patent, the '889 patent, the '398 patent, the '189 patent, the '575 patent, the '834 patent and the '230 patent;

B. that Defendants, Defendants' agents, employees, representatives, successors, and assigns and those acting, or purporting to act, in privity or in concert with Defendants, be preliminarily and permanently enjoined from further infringement, inducing infringement, and contributory infringement of the '302 patent, the '889 patent, the '398 patent, the '189 patent, the '575 patent, the '834 patent and the '230 patent;

C. that Defendants account for and pay to Rowe and Arachnid all monetary relief under 35 U.S.C. § 284, adequate to compensate for the infringement of the '302 patent, the '889 patent, the '398 patent, the '189 patent, the '575 patent, and the '834 patent, and the '230 patent, but in no event less than a reasonable royalty;

D. that Defendants account for and pay to Rowe and Arachnid enhanced damages under 35 U.S.C. § 284;

E. that Rowe and Arachnid be awarded their reasonable attorneys' fees under 35 U.S.C. § 285;

F. that Plaintiffs Rowe and Arachnid be granted pre-judgment and post-judgment interest on the damages caused by reason of Defendants' infringement of the '302 patent, the '889 patent, the '398 patent, the '189 patent, the '575 patent, the '834 patent and the '230 patent;

G. that costs be awarded to Rowe and Arachnid; and

H. that Rowe and Arachnid be granted such other and further relief as the Court may deem just and proper under the current circumstances.

DEMAND FOR JURY TRIAL

Rowe and Arachnid hereby demand a trial by jury for all issues so triable.

Date: May 15, 2006

Respectfully submitted,

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EXHIBIT A

US005355302A

United States Patent [19]

Martin et al.

[11] Patent Number: 5,355,302

[45] Date of Patent: Oct. 11, 1994

[54] **SYSTEM FOR MANAGING A PLURALITY OF COMPUTER JUKEBOXES**

[75] Inventors: **John R. Martin; Michael L. Tillery; Samuel N. Zammuto**, all of Rockford, Ill.

[73] Assignee: **Arachnid, Inc.**, Rockford, Ill.

[21] Appl. No.: **846,707**

[22] Filed: **Mar. 6, 1992**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 538,981, Jun. 15, 1990, abandoned.

[51] **Int. Cl.**[5] **G06F 15/44**

[52] **U.S. Cl.** **364/410**

[58] **Field of Search** 364/479, 410; 395/600

[56] **References Cited**

U.S. PATENT DOCUMENTS

4,232,295	11/1980	McConnell	340/152 R
4,412,292	10/1983	Sedam et al.	364/479
4,633,445	12/1986	Sprague .	
4,667,802	5/1987	Verduin et al.	194/217
4,956,768	9/1990	Sidi et al.	395/425
5,058,089	10/1991	Yoshimaru et al.	369/32

Primary Examiner—Gail O. Hayes

Attorney, Agent, or Firm—McAndrews, Held & Malloy

[57] **ABSTRACT**

A method and apparatus is shown for managing a plurality of computer jukeboxes at different locations from a central station. Each jukebox includes processor means for controlling the computer jukebox, storage and retrieval means for data, display means for selection menus, audio production means for playing musical records, and a user interface enabling patrons to communicate with the processor means. The central station can be used to download musical recording data to each computer jukebox, and each computer jukebox can upload usage data to the central station.

12 Claims, 5 Drawing Sheets

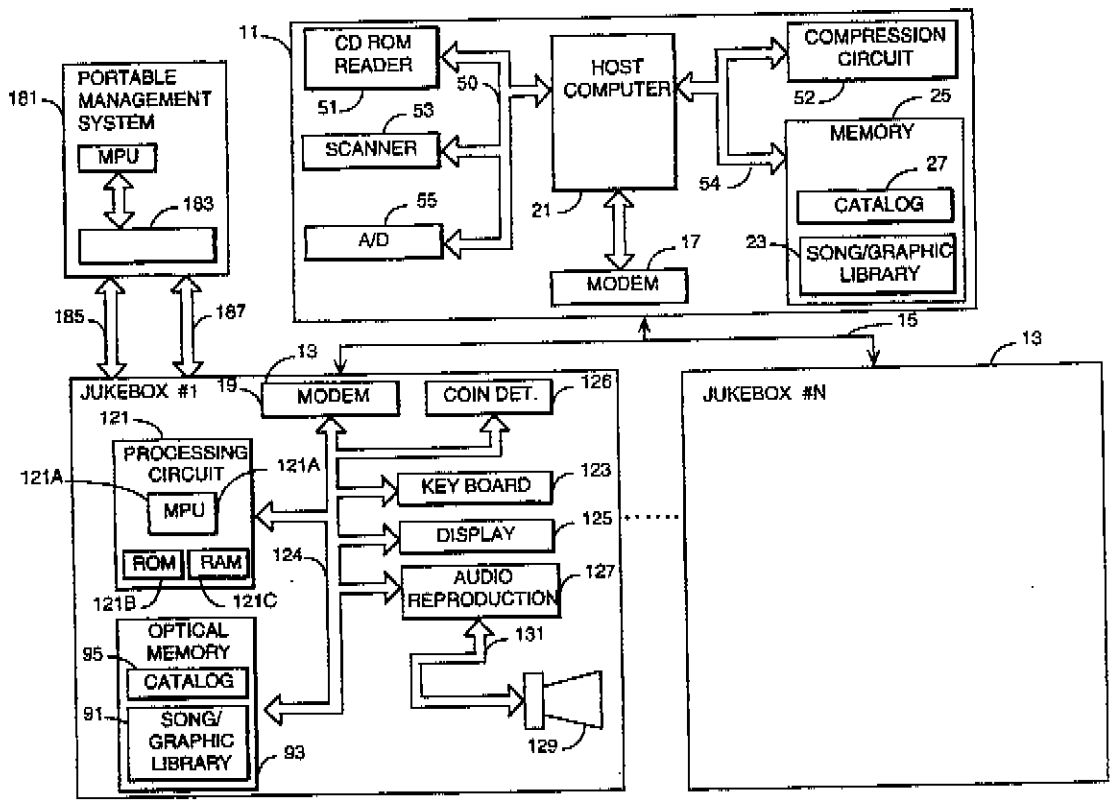
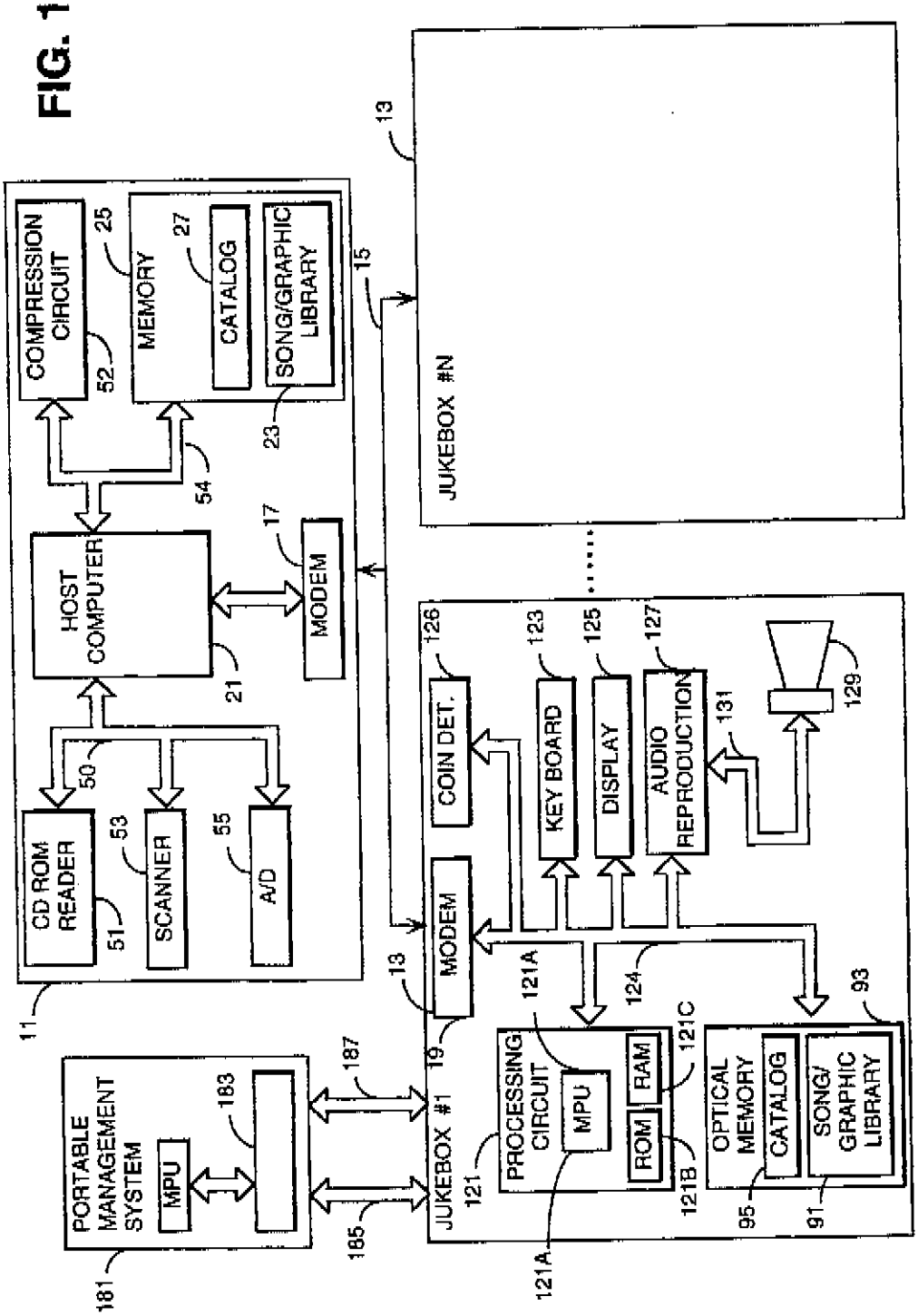


FIG. 1


JUKEBOX #N
13
15
COMPRESSION CIRCUIT
52
MEMORY
25
CATALOG
27
SONG/GRAPHIC LIBRARY
23
54
HOST COMPUTER
21
17
MODEM
50
CD ROM READER
51
SCANNER
53
A/D
55
11
COIN DET.
126
KEY BOARD
123
DISPLAY
125
AUDIO REPRODUCTION
127
131
129
MODEM
13
19
JUKEBOX #1
121A
124
93
PROCESSING CIRCUIT
121
MPU
RAM
ROM
121C
121B
OPTICAL MEMORY
95
CATALOG
SONG/ GRAPHIC LIBRARY
91
121A
PORTABLE MANAGEMENT SYSTEM
181
MPU
183
187
185

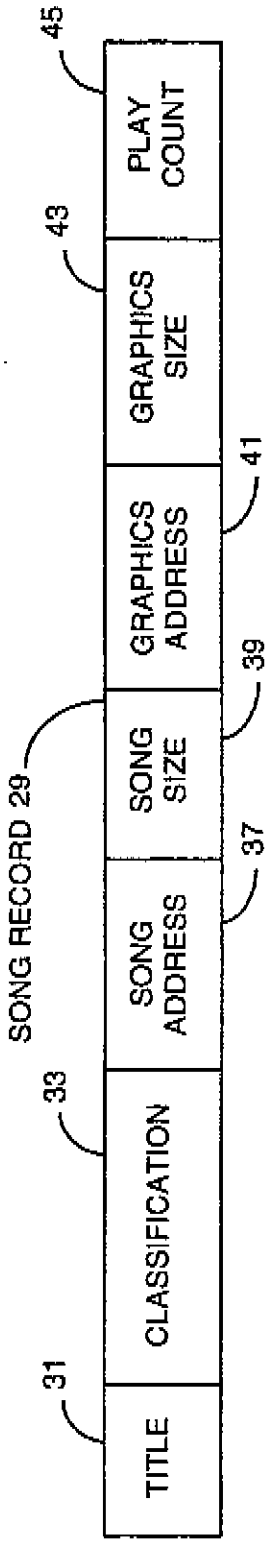

SONG RECORD 29
31
TITLE
33
CLASSIFICATION
SONG ADDRESS
37
SONG SIZE
39
GRAPHICS ADDRESS
41
43
GRAPHICS SIZE
45
PLAY COUNT

FIG. 2

FIG. 3

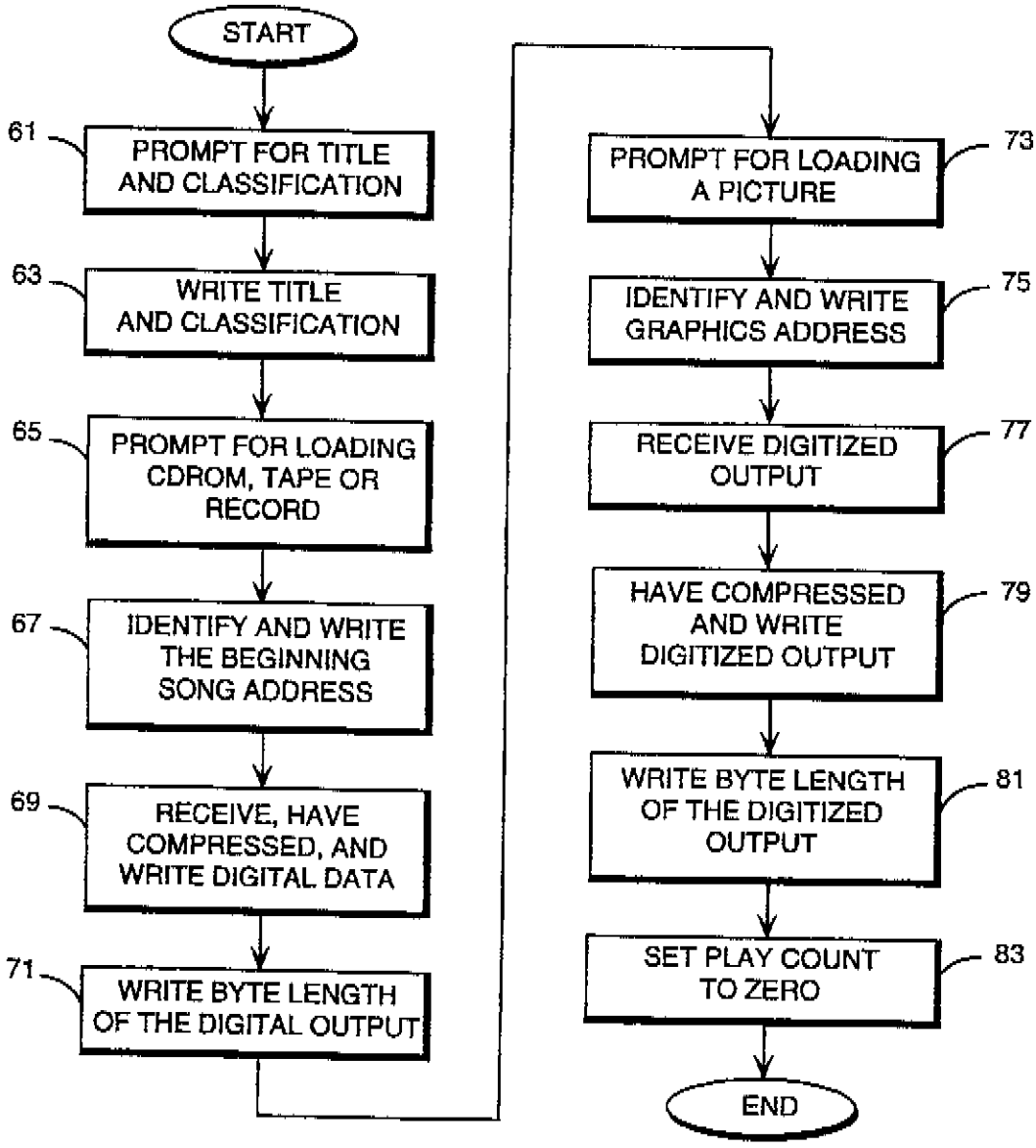

START
61
PROMPT FOR TITLE AND CLASSIFICATION
63
WRITE TITLE AND CLASSIFICATION
65
PROMPT FOR LOADING CDROM, TAPE OR RECORD
67
IDENTIFY AND WRITE THE BEGINNING SONG ADDRESS
69
RECEIVE, HAVE COMPRESSED, AND WRITE DIGITAL DATA
71
WRITE BYTE LENGTH OF THE DIGITAL OUTPUT
73
PROMPT FOR LOADING A PICTURE
75
IDENTIFY AND WRITE GRAPHICS ADDRESS
77
RECEIVE DIGITIZED OUTPUT
79
HAVE COMPRESSED AND WRITE DIGITIZED OUTPUT
81
WRITE BYTE LENGTH OF THE DIGITIZED OUTPUT
83
SET PLAY COUNT TO ZERO
END

FIG. 4A

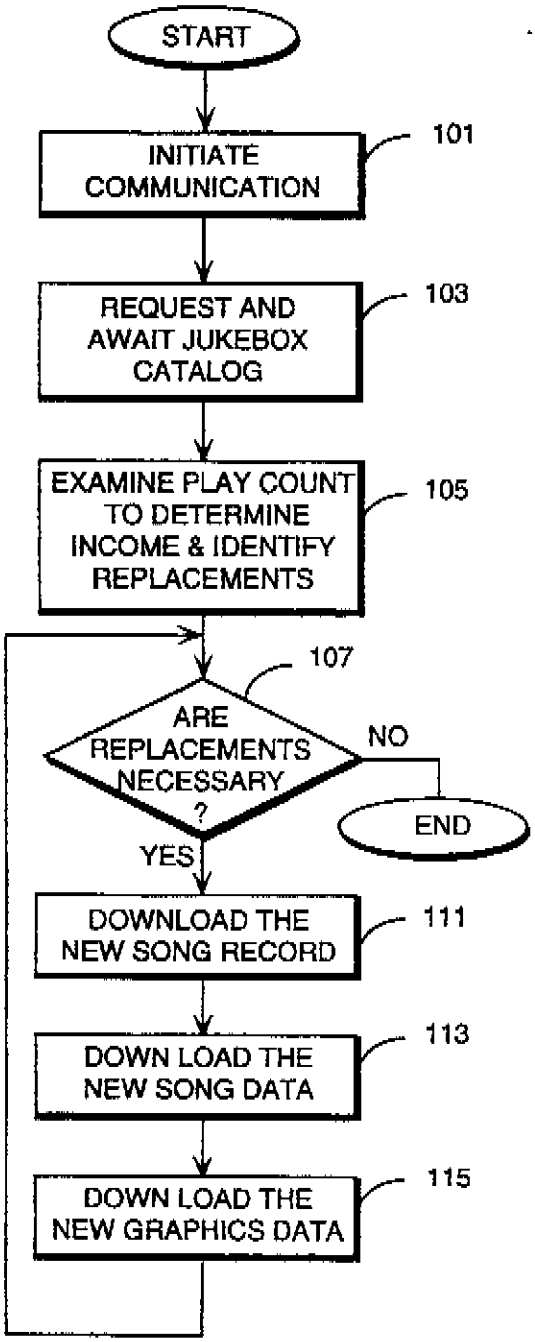

START
INITIATE COMMUNICATION
101
REQUEST AND AWAIT JUKEBOX CATALOG
103
EXAMINE PLAY COUNT TO DETERMINE INCOME & IDENTIFY REPLACEMENTS
105
107
ARE REPLACEMENTS NECESSARY ?
NO
END
YES
DOWNLOAD THE NEW SONG RECORD
111
DOWN LOAD THE NEW SONG DATA
113
DOWN LOAD THE NEW GRAPHICS DATA
115

FIG. 4B

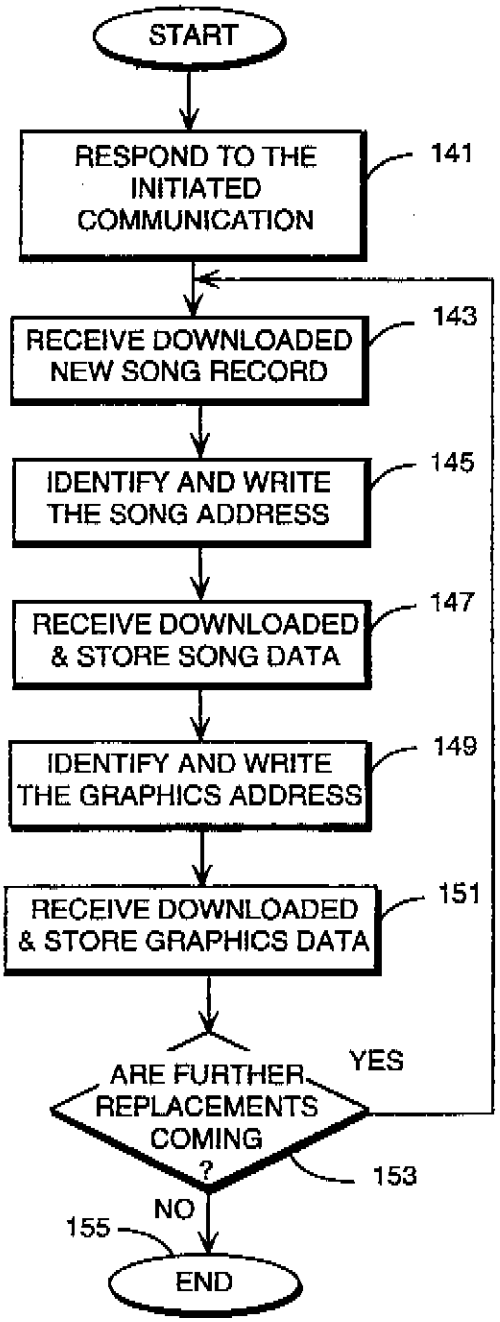
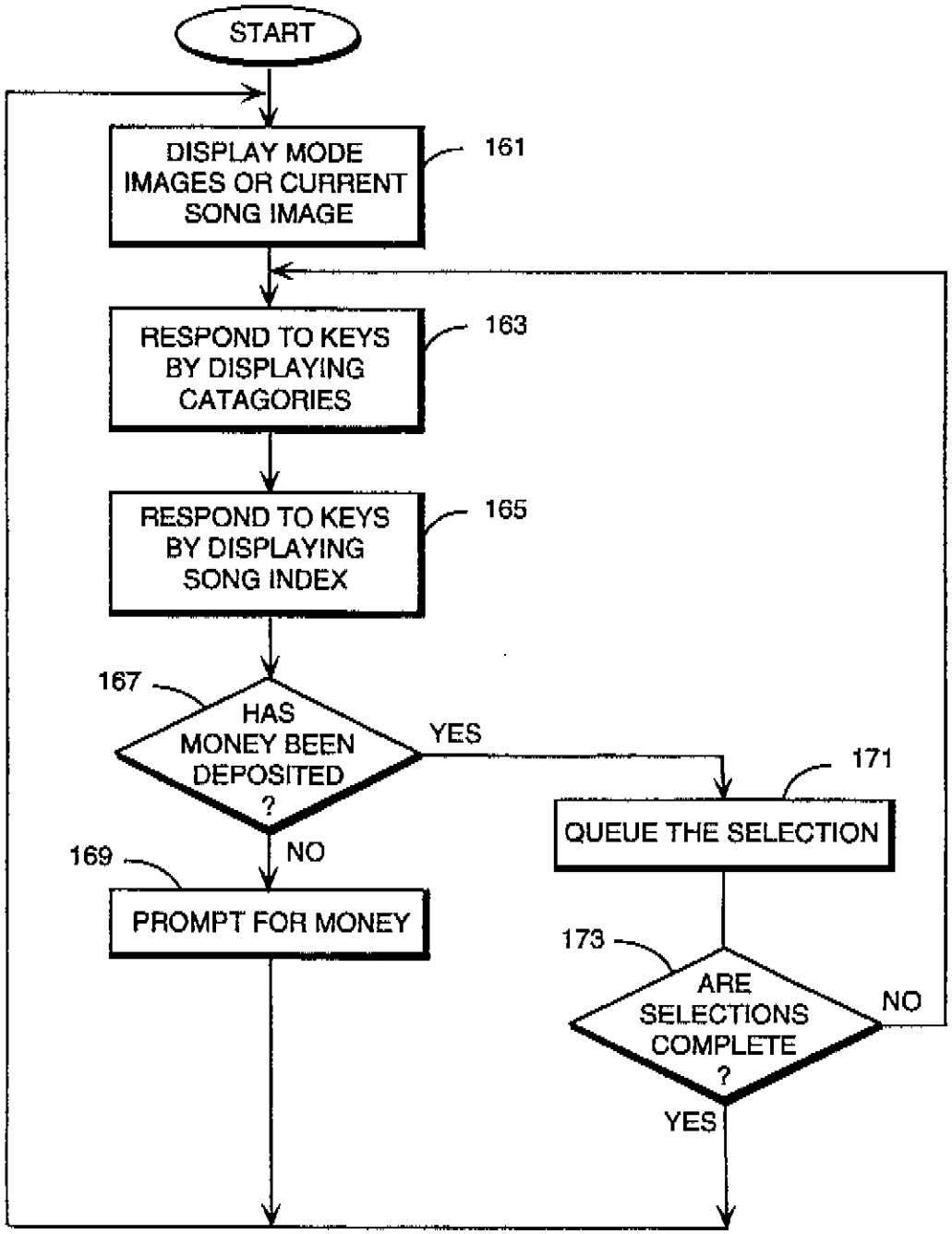

START
RESPOND TO THE INITIATED COMMUNICATION
141
RECEIVE DOWNLOADED NEW SONG RECORD
143
IDENTIFY AND WRITE THE SONG ADDRESS
145
RECEIVE DOWNLOADED & STORE SONG DATA
147
IDENTIFY AND WRITE THE GRAPHICS ADDRESS
149
RECEIVE DOWNLOADED & STORE GRAPHICS DATA
151
ARE FURTHER REPLACEMENTS COMING ?
YES
153
NO
155
END

FIG. 5


START
DISPLAY MODE IMAGES OR CURRENT SONG IMAGE
161
RESPOND TO KEYS BY DISPLAYING CATAGORIES
163
RESPOND TO KEYS BY DISPLAYING SONG INDEX
165
167
HAS MONEY BEEN DEPOSITED ?
YES
NO
171
QUEUE THE SELECTION
169
PROMPT FOR MONEY
173
ARE SELECTIONS COMPLETE ?
NO
YES

SYSTEM FOR MANAGING A PLURALITY OF COMPUTER JUKEBOXES

This is a continuation-in-part of U.S. patent application Ser. No. 07/538,981, filed Jun. 15, 1990 now abandoned.

FIELD OF THE INVENTION

The present invention relates generally to a jukebox system, and more particularly to such a system including one or more computer jukeboxes that can be managed from a remote location.

BACKGROUND OF THE INVENTION

Heretofore, an assortment of musical recordings found in a jukebox consists of a plurality of records, each record containing a specific recording. Traditionally, these records are grooved phonograph records. After a patron makes a selection, the selected phonograph record is mechanically removed from a storage rack within the jukebox, and the phonograph record is placed upon rotating platform. A stylus which is connected to a speaker system is then placed upon the rotating phonograph record, resulting in the phonograph record being played by the jukebox. For each selection, a separate phonograph record must be removed from the storage rack in order to be played by the jukebox.

Conventional jukeboxes have also implemented compact disks as means for creating an assortment of musical songs. Compact disks provide the improved sound quality made possible by digital recordings. The same technique, however, is used to play compact disks. A separate compact disk corresponding to each selection must be removed from a storage rack in order for the jukebox to play the selection.

Updating conventional jukeboxes is a costly and time consuming task. Routemen must periodically travel to each jukebox location and replace the existing recordings of each jukebox with up-to-date records. The existing recordings are no longer used by the jukebox once removed, thus making the conventional method wasteful.

Routemen must also travel to each jukebox location to keep a tally of the number of times each musical recording is selected in order to determine royalty fees. It is known to provide a jukebox with a counter that keeps track of the number of times each musical recording is selected, but routemen must still travel to each jukebox location to obtain this information. Such a process requires an excessive number of people to visit jukebox location periodically and visually read the information off the counter within each jukebox. Since the number of jukeboxes in operation is quite large, the employment of routemen to obtain such data involves a considerable expense. Furthermore, the ever changing nature of the recording industry requires that such data be gathered frequently in order to keep abreast of a continually changing market.

OBJECTS AND SUMMARY OF THE INVENTION

Accordingly, it is a primary object of the present invention to provide a method and apparatus for managing a plurality of computer jukeboxes which is capable of eliminating the necessity for routemen to change records in the jukeboxes. The computer jukeboxes store recordings in memory, thus enabling routemen to simply load new recordings into the memory of each computer jukebox.

Another object of the present invention is to eliminate a necessity for routemen by enabling new recordings and selection menus to be downloaded to each computer jukebox via a transmission link. In that regard, it is an object of the present invention to provide a method and apparatus which eliminates the material waste usually associated with updating jukeboxes. Instead of throwing away old recordings and replacing them with new ones, as is the conventional procedure, the present invention eliminates this waste by enabling new recordings to simply be downloaded into the memory of each computer jukebox. The old recordings are simply erased, if necessary.

Another object of the present invention is to provide a method and apparatus which is capable of remotely obtaining jukebox usage data, thus eliminating a necessity for routemen to do this task. The present invention utilizes a computer jukebox, which as part of its software programming, stores the number of times each musical recording is played and the number of credits that have been awarded. This data is uploaded to a central control device via a transmission link.

An additional object of the present invention is to provide a method and apparatus utilizing modern computer technology to digitally store and play musical records. The jukebox of the present invention is basically a computer having a sophisticated audio production capability, the computer storing digitized song data in a computer memory. Because conventional jukeboxes maintain compact discs or records in the jukebox, theft of the compact disc/records has been a problem, this problem being eliminated by the present invention's utilization of a computer memory to store the digitized song data.

A further object of the present invention is to provide a method and apparatus capable of being used with the remote management of jukeboxes via public telephone lines without interfering with establishments' use of their own phone lines.

Other objects, features and advantages of the present invention will be readily apparent from the following description of certain preferred embodiments thereof taken in conjunction with the accompanying drawings, although variations and modifications may be effected without departing from the spirit and scope of the novel concepts of the disclosure.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a block diagram of the computer jukebox system of the present invention;

FIG. 2 is an illustration of the data structure of an individual song record stored in a master library catalog illustrated in FIG. 1;

FIG. 3 is a flow-chart illustrating the procedure for storing new songs in a bulk storage unit illustrated in FIG. 1;

FIGS. 4A and B are flow-charts illustrating the software procedures used by the central management system and the jukebox respectively in managing the song library of the jukebox; and

FIG. 5 is a flow-chart illustrating the specific operation of the jukebox in interfacing with a user.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

In accordance with the present invention as shown in FIG. 1, a central management system 11 monitors and updates the available selection of music at a number of remotely located jukeboxes such as a jukebox 13. Particularly, the central management system 11 monitors each jukebox 13 to determine the number of times each song has been played. From these numbers, the central management system 11 can calculate the royalty payments that are due. More importantly, the central management system 11 can identify those specific songs which need to be replaced in each jukebox on an individual basis, the central management system communicating replacement songs to each jukebox 13 to update the available music selection therein as needed.

Each jukebox 13 is basically a computer having sophisticated audio production capability wherein each computer jukebox 13 is programmed to play songs that have been digitally compressed and stored in a large-volume data storage unit 93. The storage unit 93 may be a optical memory or any other available large volume nonvolatile computer memory that provides both read and write access.

The central management system 11 communicates with each computer jukebox 13 via a transmission link 15. The central management system 11 and each jukebox 13 use respective modems 17 and 19 to maintain serial communication on the transmission link 15. The transmission link 15 may be a cable system such as public or private telephone lines or the like. However, the modems 17 and 19 may be replaced with RF (radio frequency) transceivers and associated antennas. In the latter instance the transmission link 15 is an RF link.

Specifically, the central management system 11 includes a host computer 21 which maintains a master library 23 of songs and associated graphics which are stored in a compressed digital form in a bulk storage unit 25. The bulk storage unit 25 is capable of storing vast amounts of digital data, and may be take the form of a read-write optical storage device. The host computer 21 indexes the master library 23 by using a master catalog 27 which is also maintained in the bulk storage unit 25.

The master catalog 27 stores a song record 29, as illustrated in FIG. 2, for each song stored in the master library 23. Each song record 29 associates information in the following fields: a) a title field 31, containing the name of the song; b) a classification field 33, containing the type of music, i.e., country, pop, jazz, classical, etc.; c) a song address field 37, containing the beginning address in the bulk storage unit 25 of the compressed digital data of the song; d) a song size field 39, containing the number of bytes in length of the compressed digital data; e) a graphics address field 41, containing the beginning address in the bulk storage unit 25 of the compressed digital data of a graphics image, if any, to be associated with the song; f) a graphics size field 43, containing the number of bytes in length of the compressed graphics image; and g) a play count field 45, containing a count which indicates the number of times this specific song has been played. By parsing the master catalog 27, the host computer 21 can quickly locate all available information relating to any available song. The master catalog 27 also stores data particular to each jukebox such as the number of times each available song has been played, the coin intake for that jukebox, etc. The data particular to each jukebox is uploaded from the jukebox to the central management system 11 to update the master catalog 27.

Returning to FIG. 1, in order to add to the master library 23 and associated master catalog 27, the host computer 21 receives, has compressed and stores in the bulk storage unit 25 digital data representing the new song and associated pictorial graphics. The host computer 21 receives the digital data for storage from three sources: 1) a compact disc read only memory (CDROM) reader 51, which reads CDROMs; 2) a graphics scanner 53, which digitizes pictorial graphic images; and 3) an analog to digital (A/D) reader/converter 55, which reads analog data from both tapes and records and then converts the analog data into digital data. A compression circuit 52 using an adaptive-delta, pulse-code-modulation compression scheme compresses the digital data before it is stored. Other compression schemes may also be used. The compression circuit 52 might also be fully replaced by a software algorithm which is executed by the host computer 21.

FIG. 3 more specifically illustrates the operation of the host computer 21 in adding new songs to the master library 23. At a block 61, the user is initially prompted by the host computer 21 to enter a new song title and category. The host computer 21 writes this information into the title field 31 and classification field 33 of a new song record 29 at a block 63. Next, at a block 65, the host computer 21 prompts the user to place either a CDROM into the reader 51 or a record or tape into the reader/converter 55. After the user has completed this placement, at a block 67 the host computer 21 identifies available storage space in the bulk storage unit 25 by analyzing the space in use as described in the current list of song records 29 in the master catalog 23. The beginning address of this available storage space is placed in the song address field 37 of the new song record 29. Thereafter, at a block 69, the host computer 21 provides a read enable signal on a bus 50 to either the reader 51 or reader/converter 55. Either the reader 51 or reader/converter 55 responds by reading and sending digital data representing the new song to the host computer 21 via the bus 50. Utilizing a bus 54, the host computer 21 forwards the digital data received to the compression circuit 52, receives compressed digital data from the compression circuit 52 and writes the compressed digital data into the bulk storage unit 25. At a block 71, upon reaching the end of the digital data output, i.e., the end of a song, the host computer 21 writes the byte length of the digital output into the song size field 39.

The host computer 21 at a block 73 prompts the user to load a picture, such as an album cover, into the graphics scanner 53. At a block 75, the host computer 21 identifies further available storage space in the bulk storage unit 25 and places the beginning address thereof into the graphics address field 41. Once a picture is loaded, the host computer 21 at block 77, using the bus 50, provides a read enable signal to the scanner 53 which responds via bus 50 by digitizing the picture and transferring the digitized output to the host computer 21. At a block 79, using the bus 54, the host computer 21 forwards the digitized data of the picture to the compression circuit 52, receives compressed digitized data from the compression circuit 52, and writes the compressed digitized data into the bulk storage unit 25. At a block 81, upon reaching the end of the digitized output, i.e., the end of the picture, the host computer 21 places the byte length of the digitized output into the graphics

size field **43**. Finally, at a block **83**, the host computer **21** sets the play count field **45** to zero (0). This flow-chart is repeated as necessary until all of the new songs are added to the master library **27**. It is noted that the operator can also delete, modify or replace any specific song record **29** found in the master catalog **23** and master library **27**.

Returning to FIG. **1**, each computer jukebox **13** plays songs and displays graphics which are stored locally in the large-volume data storage unit **93**. The storage unit **93** of the jukebox **13** contains a subset of the songs found in the master library **27** maintained by the central management system **11**. More specifically, the storage unit **93** of the jukebox **13** stores a song library **91** which is a corresponding subset of the master library **27**. The song library **91** contains all of the currently available song selections and associated pictorial graphics for the jukebox **13**. The storage unit **93** also stores a catalog **95** that is an index into the local song library **91**. The catalog **95** is similar to the master catalog **23**. Both the song library **91** and associated catalog **95** are monitored and updated by the central management system **11** as needed via the transmission link **15**. The jukebox **13** permits this monitoring and updating at any time with no impact on its end-user performance.

The jukebox **13** also includes a processing circuit **121** which contains a microprocessor **121A**, read only memory (ROM) **121B** and random access memory (RAM) **121C**. As in conventional computer systems, the microprocessor **121A** operates in accordance with the software program contained in the ROM **121B** and utilizes the RAM **121C** for scratch-pad memory. The processing circuit **121** may also contain a decompression circuit (not shown) or may perform decompression using a software algorithm stored in the ROM **121B** depending on the type of data compression scheme used by the central management system **11**. In either case, decompression is necessary to decompress the compressed data received from the central control system **11** so that the song can be played and associated graphics image displayed.

The processing circuit **121** controls the operation and flow of data into and out of the jukebox **13** through the modem **19** via a bus **124**. Using the bus **124**, the processing circuit **121** also controls a visual display **125**, one or more selection keys **123** and a coin/bill detector **126** to provide the user with an interactive interface to the jukebox **13**. The keys **123** provide signals representing user inputs such as displayed song selection. The display **125** displays alpha numeric information as well as pictorial graphics to interface with the user. The coin/bill detector **126** is responsive to one or more coins or bills input by a customer to determine whether the proper amount of money has been input and to provide money detect signals coupled to the processing circuit. The processing circuit **121** further controls, via the bus **124**, an audio reproduction circuit **127** coupled to a speaker system **129** along a bus **131** to provide an audio output to the user.

FIGS. **4A** and **4B** are flow-charts illustrating the software procedures respectively used by the central management system **11** and the jukebox **13** in managing the song library **91** of the jukebox **13**. At a block **101**, the central management system **11** initiates communication with one of the jukeboxes **13** via the transmission link **15**. Immediately thereafter, at a block **103**, the management system **11** requests that the jukebox data be sent including a copy of the catalog **95**. At a corresponding block **141**, the jukebox **13** responds by sending the copy of the catalog file as well as other jukebox data including total money intake over a period of time. The data sent from the jukebox to the management station may also include customer requests for new songs, a customer utilizing the display and keyboard of the jukebox **13** to enter song request data as discussed below. Thereafter, at a block **105**, by examining each play count field **45** in the copy of the catalog **95** received, the management system **11** determines the royalty amount due per song and whether to replace or update specific song entries stored in the jukebox **13**. The management system **11** also determines the total money intake from the play count information and compares this value to the total money intake value received from the jukebox to provide a check. At an inquiry block **107**, if no replacements are necessary, the management system **11** branches to a block **109** to terminate communication with the jukebox **13**. If, however, replacements are necessary, the management system **11** branches to download the changes. Particularly, at a block **111**, the management system **11** downloads to the jukebox **13** the song records **29** of both the song to be replaced and the replacement song. In a corresponding block **143**, the jukebox **13** replaces the song record **29** in the catalog **95**. Thereafter, the jukebox **13** identifies available storage space in the storage unit **93** based on the song size field **39** of the new song, and writes the beginning address thereof into the song address field **37** in a corresponding block **145**. Afterwards, at a block **113**, the central management system **11** downloads the compressed digital data of the song to the jukebox **13**. At a corresponding block **147**, the jukebox **13** receives and writes the data into the song library **91**. Next, at a corresponding block **149**, the jukebox **13** identifies available storage space in the storage unit **93** based on the graphics size field **43**, and writes the beginning address thereof into the graphics address field **41** of the new song. Thereafter, at a block **115**, the management system **11** downloads the compressed digitized data of the picture to the jukebox **13**. The jukebox, at a corresponding block **151**, receives and writes the data into the song library **91**. Finally, the block **107** is again encountered. If further replacements need to be made, the blocks **111**, **113** and **115** are repeated until complete. At a corresponding block **153**, the jukebox similarly repeats the corresponding blocks **143** through **151** until no further replacements need to be made. A further block placed immediately above the block **107** may also be used, wherein the central management system **11** sends a delete, modify, add or replace command to the jukebox **13** before downloading into the song library **93**. In this way, the management system **11** receives additional flexibility in updating the jukebox **13**. It is noted that the jukebox **13** can also initiate communications with the management system **11** at predetermined times or if the jukebox determines that an event has occurred that the management system **11** should be aware of.

FIG. **5** is a flow-chart illustrating the specific operation of the processing circuit **121** of the jukebox **13** in interfacing with the user. At a block **161**, if no song selection is playing, the processing circuit **121** operates in a user attract mode, displaying a random sequence of available graphic images on the visual display **125**. More particularly, the processing circuit **121** randomly selects a starting address of the compressed graphics data from the available song records **29** in the catalog **95**. From that starting address, the circuit **121** retrieves

the data from the song library **91** via the bus **124**. The circuit **121** decompresses and transfers the data along the bus **124** to the visual display **125** for display. Thereafter, the circuit **121** again randomly selects a starting address of available graphics data and this cycle repeats. If, however, a song selection is being played when the block **161** is encountered, the attract mode sequencing does not occur. Instead, the circuit **121** displays the associated graphics image of the song being played on the display **125**. During the attract mode the processing circuit **121** may also control the display **125** to present a prompt requesting customers to enter new song requests. The new song request data entered by a customer using the keyboard is stored and uploaded to the management system **11** to aid the system **11** in determining whether new song data should be downloaded to the jukebox.

At a block **163**, the processing circuit **121** responds to a signal indicating user interest from the selection keys **123** by providing on the display **125** those music categories, i.e., country, rock, jazz, etc., found in the catalog **95**. At a block **165**, the circuit **121** responds to a signal indicating a category selection from the keys **123** by providing on the display **125** an index of available songs, arranged alphabetically either by artist or title, which can be scrolled and selected using the keys **123**. Upon selection of a specific song, the circuit **121** encounters an inquiry block **167**. If at the block **167** the circuit **121** determines from the signal received from the money detector **125** that a sufficient amount of money has not been deposited, a branch to a block **169** occurs. At the block **169**, using the display **125**, the circuit **121** prompts the user to deposit money into the coin/bill detector **126**, then branches back to the block **161**. However, if sufficient moneys have been deposited, the circuit **121** branches to a block **171** wherein the circuit **121** updates the play count field of the selected song's record in the catalog file **95** and money intake data stored in the memory. The circuit also places the song record **29** corresponding to the selected song into a queue of song records to be played. After the selection is queued, the circuit **121** encounters an inquiry block **153**. If the total number of selections purchased have been selected, the circuit **121** branches back to the block **161**. Otherwise, if further purchased selections are forthcoming, the circuit **121** branches back to the block **163**. In this manner, all of the selections are made and placed in the queue. Upon completion of playing a queued-up, selected song, the circuit **121** removes the corresponding song record **29** from the queue, selects the next song record in the queue, begins to play that next song, and executes the block **161**. It is noted that the song queue can be displayed on the display **125** in order to show customers what songs have already been selected prior to making their selection.

More specifically, referring back to FIG. **1**, once a specific song has been selected and queued-up, the processing circuit **121** first identifies the beginning address of the compressed digital data from the song address field **37** of the song record **29** in the queue. From this address, using the bus **124**, the circuit **121** reads the compressed digital data out of the storage unit **93**, decompresses that data, and sends the decompressed digital data to the audio reproduction circuit **127**. The audio reproduction circuit **127**, commonly found in CDROM readers and associated amplifiers, converts the digital data to an analog signal which is amplified and used to drive the speaker system **129** via the bus **131**. After a selected song finishes playing, the processing circuit **121** deletes the song record **29** of the selected song from the queue, increments the play count field **45** associated with that song in the catalog **95**, and begins playing the next selected song in the queue if any exists. The process set forth in the flow-chart detailed in FIG. **5** is then repeated.

While the present invention is being described and illustrated in accordance with the preferred embodiment enabling new recordings and computer usage data to be transferred via the transmission line **15**, the monitoring and updating may also be directly transferred. In this latter embodiment, routemen physically visit the location of each computer jukebox **13**. During these visits, the routemen carry a portable management system **181** which has only a subset of potential replacement songs stored in a subset library and associated catalog (not shown) on a portable bulk storage unit **183**. The subset library is loaded by the portable management system **181** onto the portable bulk storage unit **183** either directly from the bulk storage unit **25** or indirectly as is initially done by the central management system **11** (described above). In all other ways, the portable management system **181** operates the same as the central management system **11**, collecting the catalog **95** of each jukebox **13** and updating or replacing as necessary. To accomplish this, the portable management system **181** communicates at a very high rate of speed with the jukebox **13** via a parallel communication link **185** and a direct memory access (DMA) link **187**.

Additionally, the routemen may simply exchange the "old" storage unit **93** with a pre-loaded storage unit (not shown). The central management system **11** may later read the "old" storage unit **93** to gather the information from the catalog **95**. Such an embodiment still enjoys the other advantages made possible by the computer jukeboxes **13** described herein.

Additionally, it is to be understood that the embodiments of the present invention described hereinabove are merely illustrative and that other modifications and adaptations may be made without departing from the scope of the appended claims.

We claim:

1. A computer jukebox capable of being updated upon the receipt of digital data representing a plurality of songs, data representing the identity of each of said songs and data representing the amount of storage space necessary to store said digital song data in said jukebox, comprising:

song selection means actuable by a user for generating a signal representing a song selected from a plurality of songs stored in said jukebox;

a programmable computer memory storing digital data representing each selectable song stored in said jukebox and a catalog file including data for each stored song representing the identity of said song and the location in said computer memory of the digital data representing said song;

a communication interface for receiving said digital song data, said song identity data and said storage space data;

audio speakers;

a digital to analog converter coupled between said song storing computer memory and said audio speakers to convert digital song data to an analog signal coupled to said speakers; and

processing means responsive to a song selection signal for accessing said digital data representing a

selected song from said computer memory to apply said song data to said digital to analog converter and said processing means being responsive to digital song data, song identity data and storage space data received by said communication interface to control the storage of said digital song data to update said jukebox.

2. A computer jukebox as recited in claim 1 wherein said song selection means includes means for displaying information identifying each song stored in said jukebox, said processing means being responsive to said catalog file data to control the information displayed on said display means to represent said updated jukebox song selections.

3. A computer jukebox as recited in claim 1 wherein said communication interface includes a modem.

4. A computer jukebox as recited in claim 1 wherein said communication interface includes a radio frequency receiver.

5. A computer jukebox as recited in claim 1 wherein said communication interface includes a direct communication interface port.

6. A computer jukebox as recited in claim 1 further including a money intake device, said device generating a money detection signal upon the receipt of money intake of a predetermined amount, said processing means being responsive to said money detector signal to update a money intake memory location in said computer memory, said location storing data representing the total intake of money for said jukebox over a period of time, said communication interface including means for transmitting said money intake data to a remote location under the control of said processing means.

7. A jukebox network comprising: a plurality of computer jukeboxes, each jukebox including

a programmable computer memory storing digital data representing a plurality of selectable songs and data for each stored song representing the identity of said song and the location in said computer memory of the digital data representing said song;

a song selection device actuable by a user to select a song stored in said memory;

a communication interface for receiving and transmitting digital data including digital song data; and

processing means responsive to a song select signal for controlling the accessing of song data stored in said memory to control the playing of a song and to store song usage data in said memory, said processing means being responsive to the receipt of digital song data by said communication interface to control the storage of said song data in said computer memory;

a management station for updating said plurality of jukeboxes, said management station including a communication interface for receiving and transmitting data and a host processing means for controlling the transmission of digital song data to a computer jukebox to update the jukebox, said management station being operative for selectively transmitting digital song data to different ones of said jukeboxes in response to song usage data received from a respective jukebox.

8. A jukebox network as recited in claim 7 wherein said management station is remote from said plurality of jukeboxes and the communication interface of said management station and each jukebox provides a two way communication link between said remote management station and said jukebox.

9. A jukebox network as recited in claim 7 wherein said management station is portable.

10. A jukebox network as recited in claim 9 wherein said communication interface of said management station and a jukebox provides a direct connection between said station and said jukebox.

11. A jukebox network as recited in claim 7 wherein said song usage data comprises a play count for each song on a jukebox, said play count corresponding to the number of a song has been played on respective jukebox.

12. A jukebox network as recited in claim 7 wherein said processing means processes said song usage data to determine which songs should be replaced on a respective jukebox.

* * * * *

EXHIBIT B

US005781889A

United States Patent [19]

Martin et al.

[11] Patent Number: 5,781,889

[45] Date of Patent: *Jul. 14, 1998

[54] **COMPUTER JUKEBOX AND JUKEBOX NETWORK**

[76] Inventors: **John R. Martin**, 5635 Nebeshonee La.; **Michael L. Tillery**, 4919 Spring Brook Rd.; **Samuel N. Zammuto**, 2308 24th St., all of Rockford, Ill. 61103

[*] Notice: The term of this patent shall not extend beyond the expiration date of Pat. No. 5,355,302

[21] Appl. No.: **584,253**

[22] Filed: **Jan. 11, 1996**

Related U.S. Application Data

[60] Continuation of Ser. No. 268,782, Jun. 30, 1994, abandoned, which is a division of Ser. No. 846,707, Mar. 6, 1992, Pat. No. 5,355,302, which is a continuation-in-part of Ser. No. 538,981, Jun. 15, 1990, abandoned.

[51] **Int. Cl.**[6] **G06F 17/60**

[52] **U.S. Cl.** **705/1**; 364/410; 364/479.04

[58] **Field of Search** 364/410, 479.04, 364/479.06, 479.02, 479.03; 395/201, 210, 615; 369/32; 235/381

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Primary Examiner—Robert A. Weinhardt
Attorney, Agent, or Firm—McAndrews, Held & Malloy

[57] **ABSTRACT**

A central management system manages a plurality of computer jukeboxes and communicates compressed digital data with each jukebox via a transmission link. The management system also includes a host computer that maintains a master set of compressed digital data representing a plurality of songs, song associated graphics, and song identity information. Each jukebox includes a storage unit that is capable of storing a subset of the master set and a processing circuit having a decompression circuit. The processing circuit controls the operation and flow of digital data into and out of the jukebox through the transmission link as well as a visual song information display, user song selection keys, a money detector, and an audio reproduction circuit coupled to a speaker system so as to provide audio output to users of the jukebox.

13 Claims, 5 Drawing Sheets

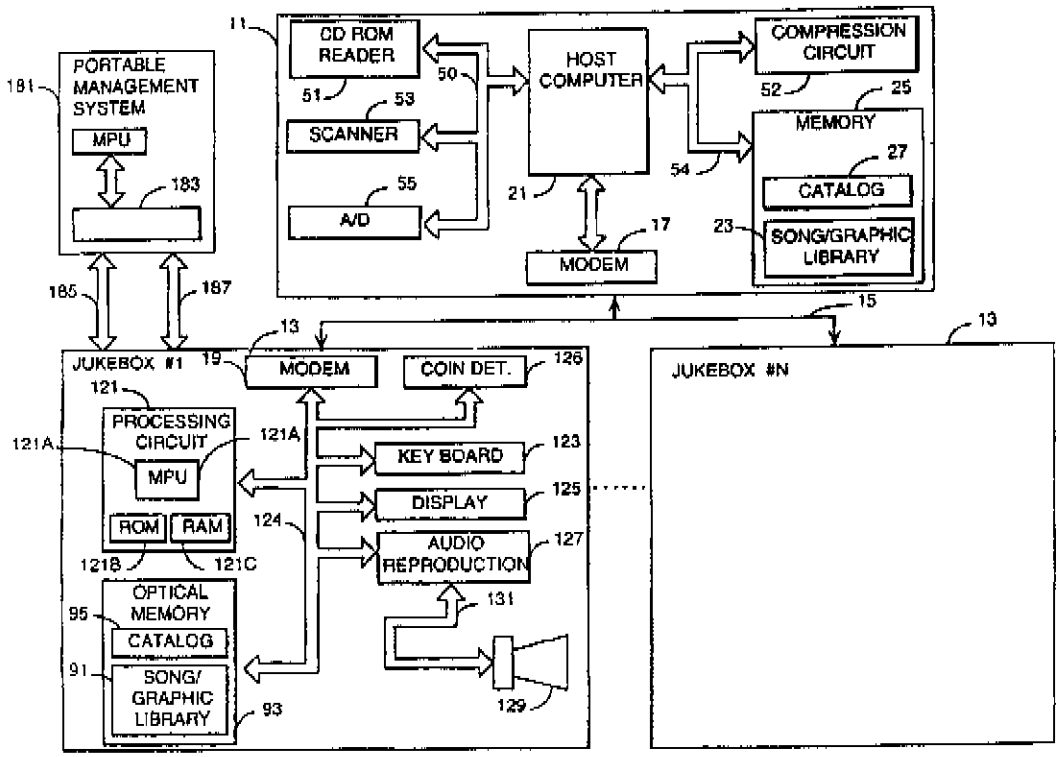
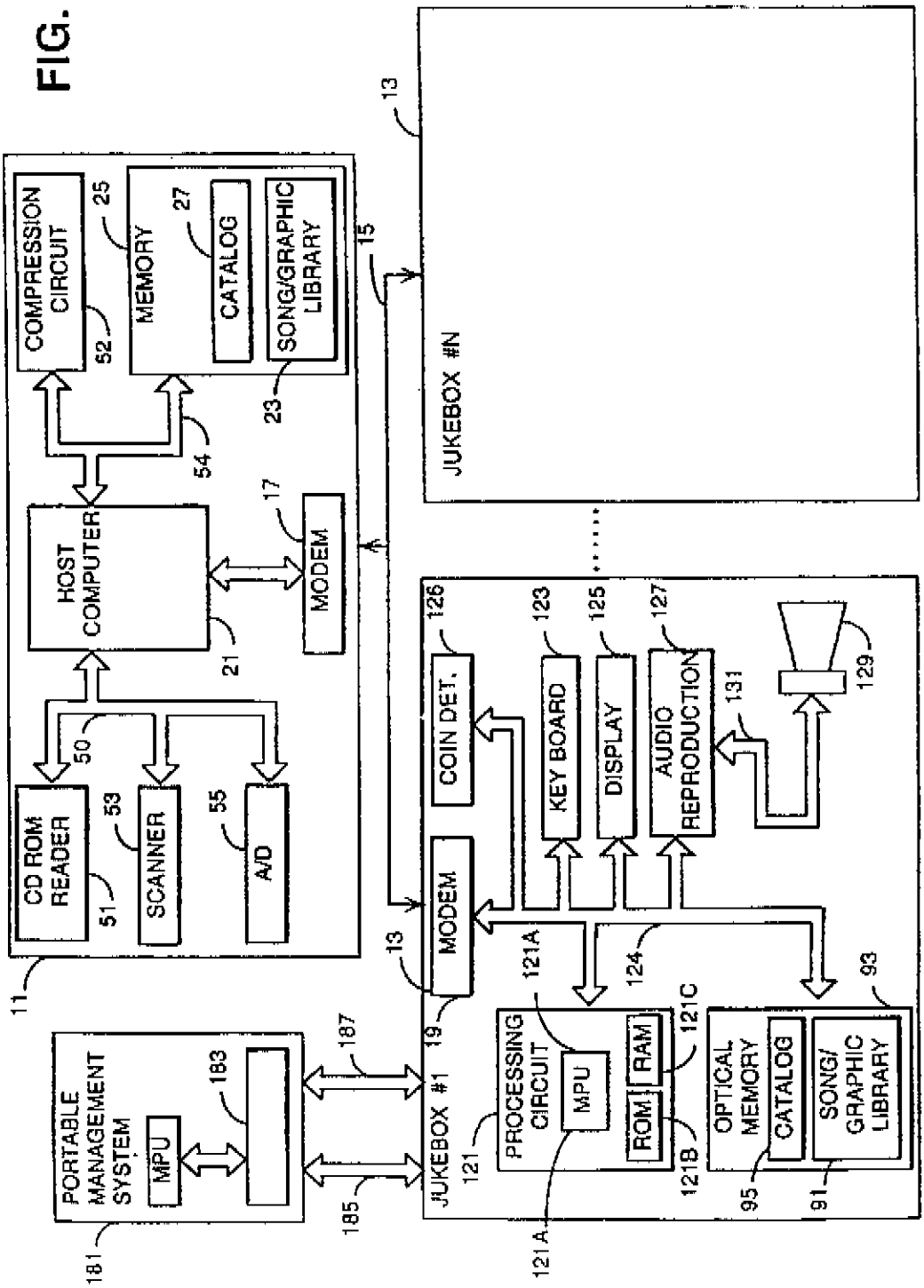


FIG. 1


JUKEBOX #N
13
15
COMPRESSION CIRCUIT
25
52
MEMORY
27
CATALOG
SONG/GRAPHIC LIBRARY
23
54
HOST COMPUTER
21
17
MODEM
50
CD ROM READER
51
53
SCANNER
55
A/D
11
COIN DET.
126
KEY BOARD
123
DISPLAY
125
AUDIO REPRODUCTION
127
131
129
MODEM
13
19
JUKEBOX #1
121A
124
93
PROCESSING CIRCUIT
121
MPU
RAM
ROM
121B
121C
OPTICAL MEMORY
95
CATALOG
SONG/ GRAPHIC LIBRARY
91
121A
187
185
PORTABLE MANAGEMENT SYSTEM
181
MPU
183

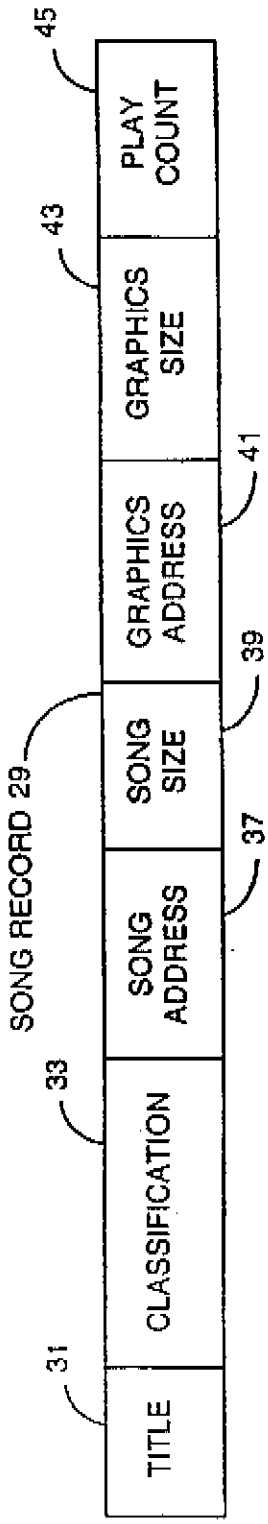

SONG RECORD 29
TITLE
31
CLASSIFICATION
33
SONG ADDRESS
37
SONG SIZE
39
GRAPHICS ADDRESS
41
GRAPHICS SIZE
43
PLAY COUNT
45

FIG. 2

FIG. 3

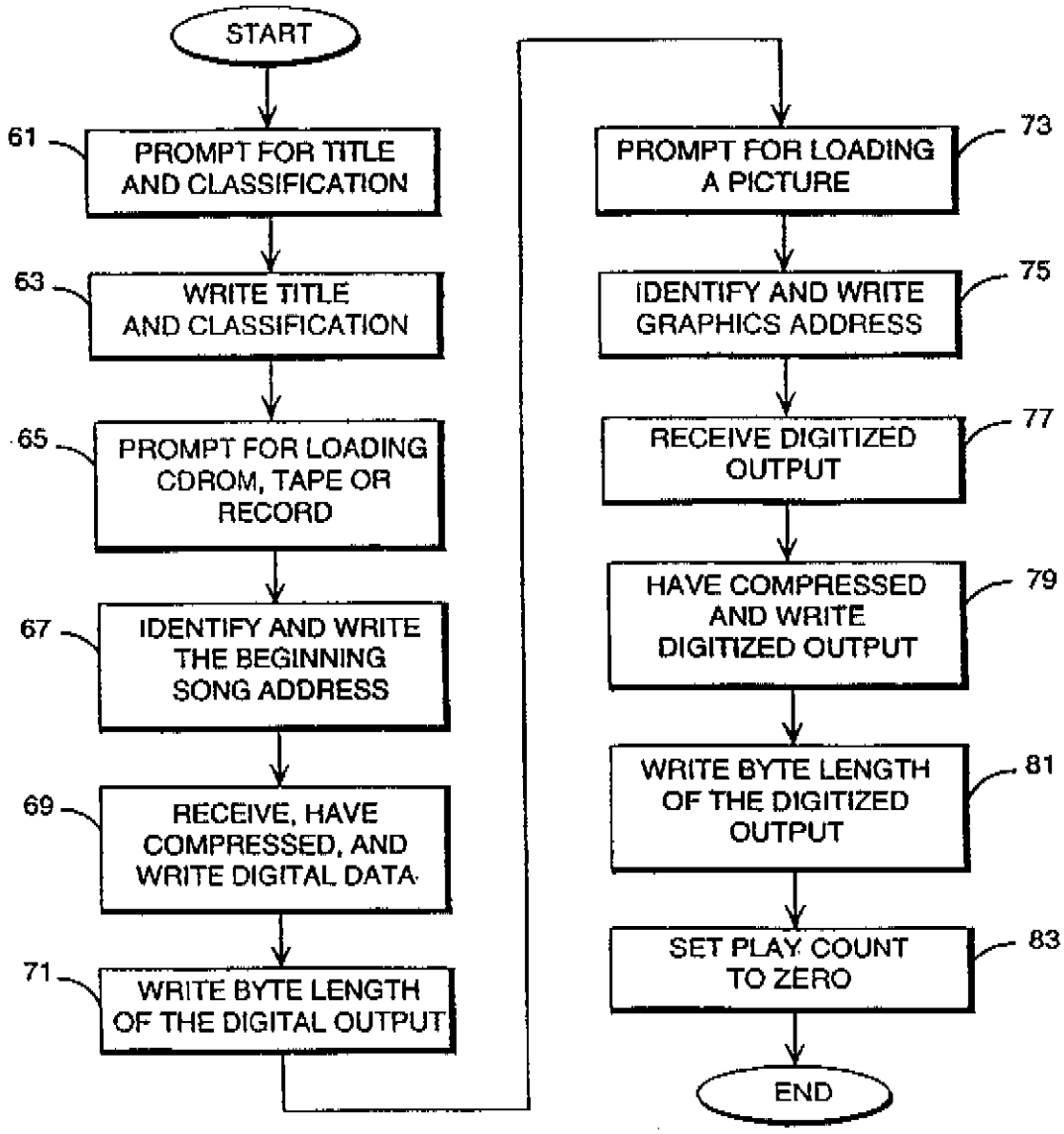

START
61
PROMPT FOR TITLE AND CLASSIFICATION
63
WRITE TITLE AND CLASSIFICATION
65
PROMPT FOR LOADING CDROM, TAPE OR RECORD
67
IDENTIFY AND WRITE THE BEGINNING SONG ADDRESS
69
RECEIVE, HAVE COMPRESSED, AND WRITE DIGITAL DATA
71
WRITE BYTE LENGTH OF THE DIGITAL OUTPUT
73
PROMPT FOR LOADING A PICTURE
75
IDENTIFY AND WRITE GRAPHICS ADDRESS
77
RECEIVE DIGITIZED OUTPUT
79
HAVE COMPRESSED AND WRITE DIGITIZED OUTPUT
81
WRITE BYTE LENGTH OF THE DIGITIZED OUTPUT
83
SET PLAY COUNT TO ZERO
END

FIG. 4A

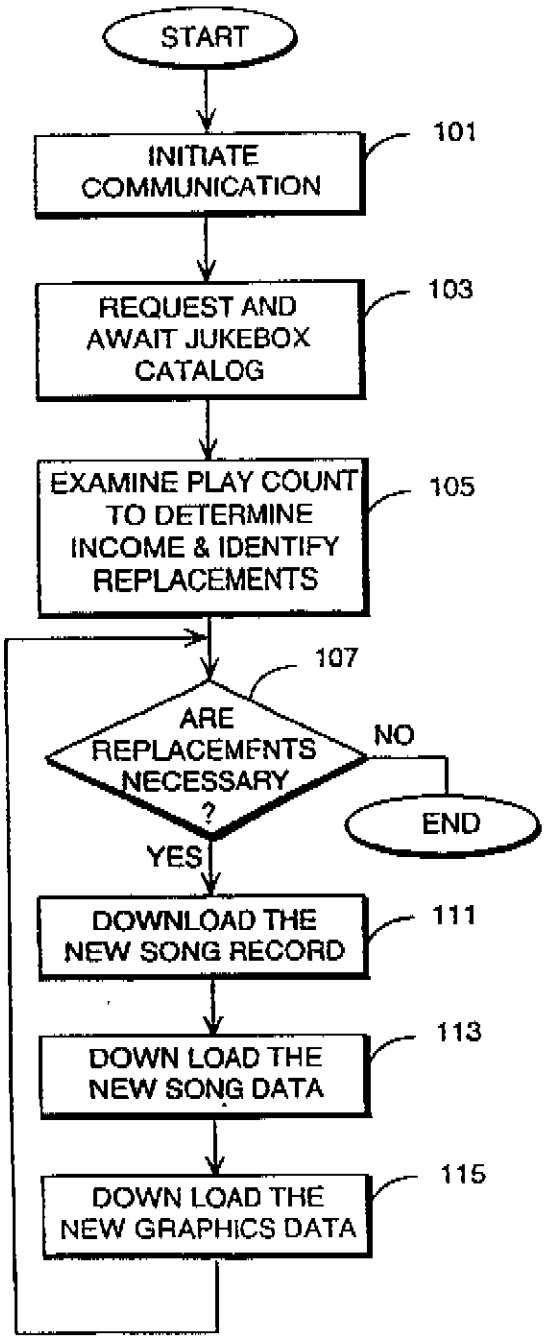

START
INITIATE COMMUNICATION
101
REQUEST AND AWAIT JUKEBOX CATALOG
103
EXAMINE PLAY COUNT TO DETERMINE INCOME & IDENTIFY REPLACEMENTS
105
107
ARE REPLACEMENTS NECESSARY ?
NO
END
YES
DOWNLOAD THE NEW SONG RECORD
111
DOWN LOAD THE NEW SONG DATA
113
DOWN LOAD THE NEW GRAPHICS DATA
115

FIG. 4B

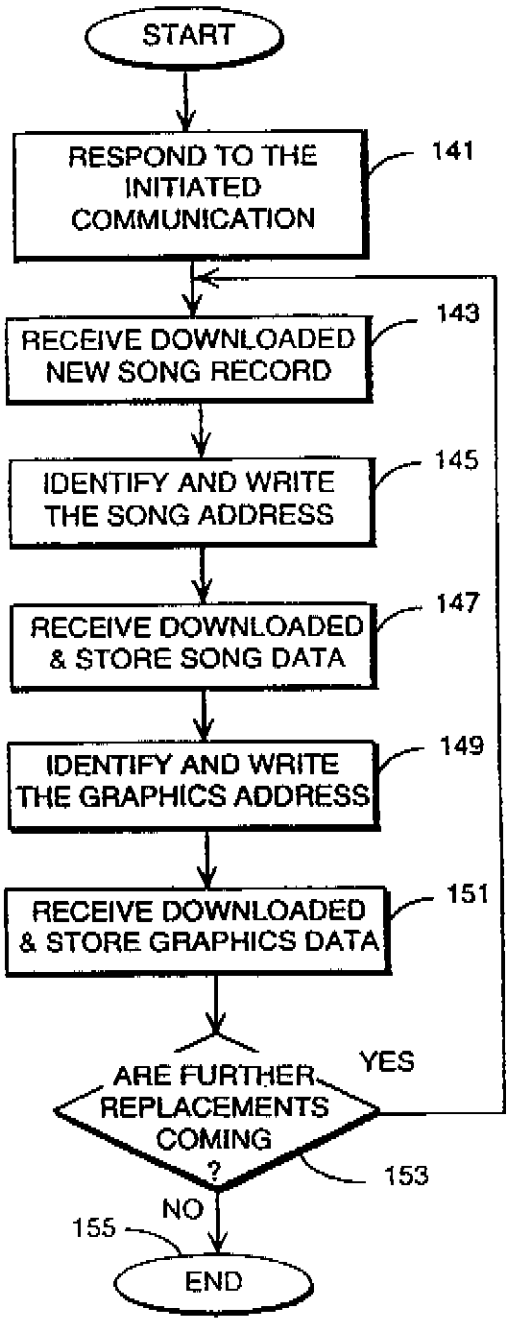
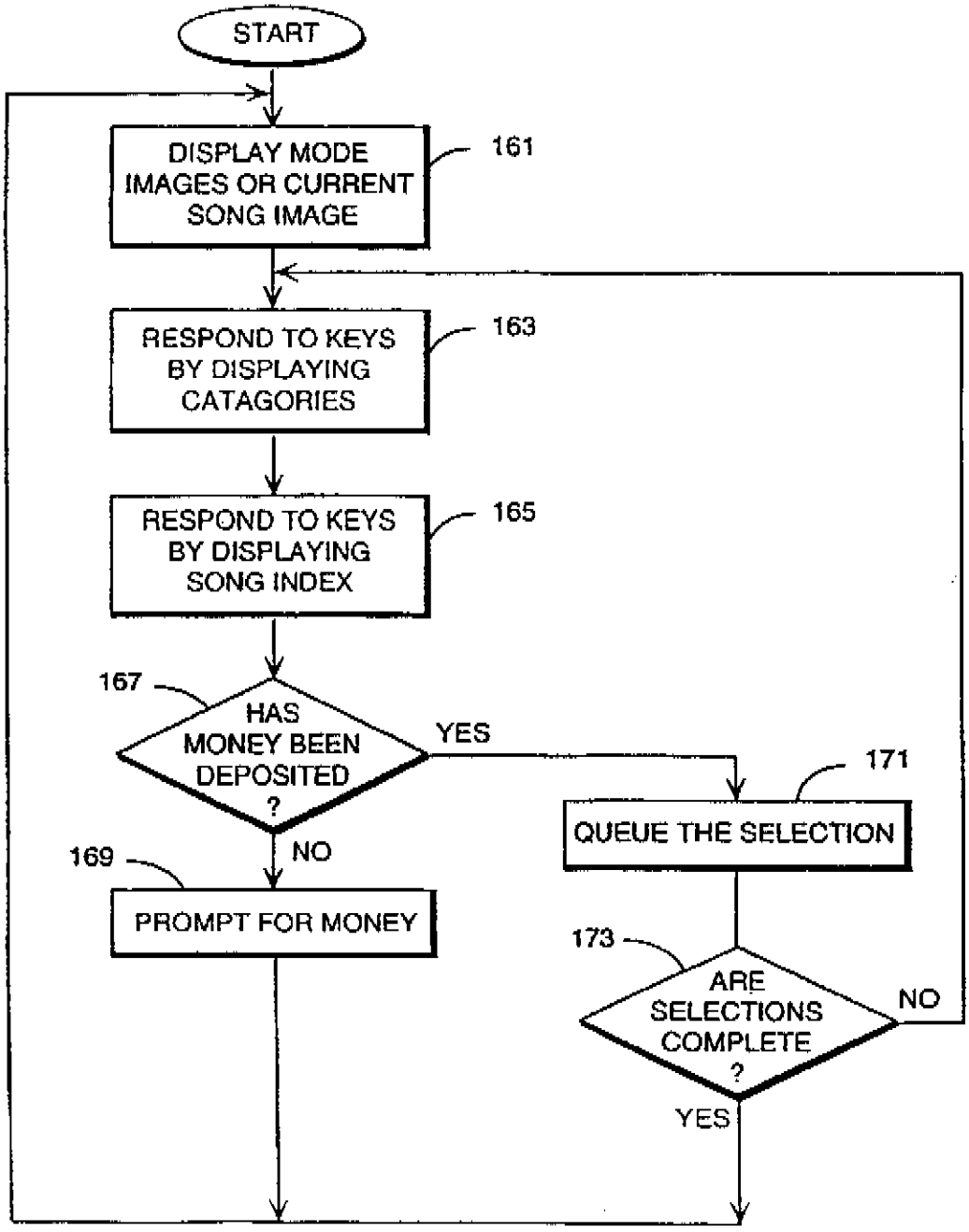

START
RESPOND TO THE INITIATED COMMUNICATION
141
RECEIVE DOWNLOADED NEW SONG RECORD
143
IDENTIFY AND WRITE THE SONG ADDRESS
145
RECEIVE DOWNLOADED & STORE SONG DATA
147
IDENTIFY AND WRITE THE GRAPHICS ADDRESS
149
RECEIVE DOWNLOADED & STORE GRAPHICS DATA
151
ARE FURTHER REPLACEMENTS COMING ?
YES
153
NO
155
END

FIG. 5


START
DISPLAY MODE IMAGES OR CURRENT SONG IMAGE
161
RESPOND TO KEYS BY DISPLAYING CATAGORIES
163
RESPOND TO KEYS BY DISPLAYING SONG INDEX
165
167
HAS MONEY BEEN DEPOSITED ?
YES
NO
171
QUEUE THE SELECTION
169
PROMPT FOR MONEY
173
ARE SELECTIONS COMPLETE ?
NO
YES

COMPUTER JUKEBOX AND JUKEBOX NETWORK

This application is a continuation of U.S. patent application Ser. No. 268,782 filed Jun. 30, 1994, now abandoned; which is a division of U.S. patent application Ser. No. 846,707, filed Mar. 6, 1992, now U.S. Pat. No. 5,355,302; which is a continuation-in-part of U.S. application Ser. No. 538,981 filed Jun. 15, 1990, now abandoned.

FIELD OF THE INVENTION

The present invention relates generally to a jukebox system, and more particularly to such a system including one or more computer jukeboxes that can be managed from a remote location.

BACKGROUND OF THE INVENTION

Heretofore, an assortment of musical recordings found in a jukebox consists of a plurality of records, each record containing a specific recording. Traditionally, these records are grooved phonograph records. After a patron makes a selection, the selected phonograph record is mechanically removed from a storage rack within the jukebox, and the phonograph record is placed upon rotating platform. A stylus which is connected to a speaker system is then placed upon the rotating phonograph record, resulting in the phonograph record being played by the jukebox. For each selection, a separate phonograph record must be removed from the storage rack in order to be played by the jukebox.

Conventional jukeboxes have also implemented compact disks as means for creating an assortment of musical songs. Compact disks provide the improved sound quality made possible by digital recordings. The same technique, however, is used to play compact disks. A separate compact disk corresponding to each selection must be removed from a storage rack in order for the jukebox to play the selection.

Updating conventional jukeboxes is a costly and time consuming task. Routemen must periodically travel to each jukebox location and replace the existing recordings of each jukebox with up-to-date records. The existing recordings are no longer used by the jukebox once removed, thus making the conventional method wasteful.

Routemen must also travel to each jukebox location to keep a tally of the number of times each musical recording is selected in order to determine royalty fees. It is known to provide a jukebox with a counter that keeps track of the number of times each musical recording is selected, but routemen must still travel to each jukebox location to obtain this information. Such a process requires an excessive number of people to visit jukebox location periodically and visually read the information off the counter within each jukebox. Since the number of jukeboxes in operation is quite large, the employment of routemen to obtain such data involves a considerable expense. Furthermore, the ever changing nature of the recording industry requires that such data be gathered frequently in order to keep abreast of a continually changing market.

OBJECTS AND SUMMARY OF THE INVENTION

Accordingly, it is a primary object of the present invention to provide a method and apparatus for managing a plurality of computer jukeboxes which is capable of eliminating the necessity for routemen to change records in the jukeboxes. The computer jukeboxes store recordings in memory, thus

enabling routemen to simply load new recordings into the memory of each computer jukebox.

Another object of the present invention is to eliminate a necessity for routemen by enabling new recordings and selection menus to be downloaded to each computer jukebox via a transmission link. In that regard, it is an object of the present invention to provide a method and apparatus which eliminates the material waste usually associated with updating jukeboxes. Instead of throwing away old recordings and replacing them with new ones, as is the conventional procedure, the present invention eliminates this waste by enabling new recordings to simply be downloaded into the memory of each computer jukebox. The old recordings are simply erased, if necessary.

Another object of the present invention is to provide a method and apparatus which is capable of remotely obtaining jukebox usage data, thus eliminating a necessity for routemen to do this task. The present invention utilizes a computer jukebox, which as part of its software programming, stores the number of times each musical recording is played and the number of credits that have been awarded. This data is uploaded to a central control device via a transmission link.

An additional object of the present invention is to provide a method and apparatus utilizing modern computer technology to digitally store and play musical records. The jukebox of the present invention is basically a computer having a sophisticated audio production capability, the computer storing digitized song data in a computer memory. Because conventional jukeboxes maintain compact discs or records in the jukebox, theft of the compact disc/records has been a problem, this problem being eliminated by the present invention's utilization of a computer memory to store the digitized song data.

A further object of the present invention is to provide a method and apparatus capable of being used with the remote management of jukeboxes via public telephone lines without interfering with establishments' use of their own phone lines.

Other objects, features and advantages of the present invention will be readily apparent from the following description of certain preferred embodiments thereof taken in conjunction with the accompanying drawings, although variations and modifications may be effected without departing from the spirit and scope of the novel concepts of the disclosure.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a block diagram of the computer jukebox system of the present invention;

FIG. 2 is an illustration of the data structure of an individual song record stored in a master library catalog illustrated in FIG. 1;

FIG. 3 is a flow-chart illustrating the procedure for storing new songs in a bulk storage unit illustrated in FIG. 1;

FIGS. 4A and B are flow-charts illustrating the software procedures used by the central management system and the jukebox respectively in managing the song library of the jukebox; and

FIG. 5 is a flow-chart illustrating the specific operation of the jukebox in interfacing with a user.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

In accordance with the present invention as shown in FIG. 1, a central management system 11 monitors and updates the

available selection of music at a number of remotely located jukeboxes such as a jukebox 13. Particularly, the central management system 11 monitors each jukebox 13 to determine the number of times each song has been played. From these numbers, the central management system 11 can calculate the royalty payments that are due. More importantly, the central management system 11 can identify those specific songs which need to be replaced in each jukebox on an individual basis, the central management system communicating replacement songs to each jukebox 13 to update the available music selection therein as needed.

Each jukebox 13 is basically a computer having sophisticated audio production capability wherein each computer jukebox 13 is programmed to play songs that have been digitally compressed and stored in a large-volume data storage unit 93. The storage unit 93 may be a optical memory or any other available large volume nonvolatile computer memory that provides both read and write access.

The central management system 11 communicates with each computer jukebox 13 via a transmission link 15. The central management system 11 and each jukebox 13 use respective modems 17 and 19 to maintain serial communication on the transmission link 15. The transmission link 15 may be a cable system such as public or private telephone lines or the like. However, the modems 17 and 19 may be replaced with RF (radio frequency) transceivers and associated antennas. In the latter instance the transmission link 15 is an RF link.

Specifically, the central management system 11 includes a host computer 21 which maintains a master library 23 of songs and associated graphics which are stored in a compressed digital form in a bulk storage unit 25. The bulk storage unit 25 is capable of storing vast amounts of digital data, and may be take the form of a read-write optical storage device. The host computer 21 indexes the master library 23 by using a master catalog 27 which is also maintained in the bulk storage unit 25.

The master catalog 27 stores a song record 29, as illustrated in FIG. 2, for each song stored in the master library 23. Each song record 29 associates information in the following fields: a) a title field 31, containing the name of the song; b) a classification field 33, containing the type of music, i.e., country, pop, jazz, classical etc.; c) a song address field 37, containing the beginning address in the bulk storage unit 25 of the compressed digital data of the song; d) a song size field 39, containing the number of bytes in length of the compressed digital data; e) a graphics address field 41, containing the beginning address in the bulk storage unit 25 of the compressed digital data of a graphics image, if any, to be associated with the song; f) a graphics size field 43, containing the number of bytes in length of the compressed graphics image; and g) a play count field 45, containing a count which indicates the number of times this specific song has been played. By parsing the master catalog 27, the host computer 21 can quickly locate all available information relating to any available song. The master catalog 27 also stores data particular to each jukebox such as the number of times each available song has been played, the coin intake for that jukebox, etc. The data particular to each jukebox is uploaded from the jukebox to the central management system 11 to update the master catalog 27.

Returning to FIG. 1, in order to add to the master library 23 and associated master catalog 27, the host computer 21 receives, has compressed and stores in the bulk storage unit 25 digital data representing the new song and associated pictorial graphics. The host computer 21 receives the digital data for storage from three sources: 1) a compact disc read only memory (CDROM) reader 51, which reads CDROMS; 2) a graphics scanner 53, which digitizes pictorial graphic images; and 3) an analog to digital (A/D) reader/converter 55, which reads analog data from both tapes and records and then converts the analog data into digital data. A compression circuit 52 using an adaptive-delta, pulse-code-modulation compression scheme compresses the digital data before it is stored. Other compression schemes may also be used. The compression circuit 52 might also be fully replaced by a software algorithm which is executed by the host computer 21.

FIG. 3 more specifically illustrates the operation of the host computer 21 in adding new songs to the master library 23. At a block 61, the user is initially prompted by the host computer 21 to enter a new song title and category. The host computer 21 writes this information into the title field 31 and classification field 33 of a new song record 29 at a block 63. Next, at a block 65, the host computer 21 prompts the user to place either a CDROM into the reader 51 or a record or tape into the reader/converter 55. After the user has completed this placement, at a block 67 the host computer 21 identifies available storage space in the bulk storage unit 25 by analyzing the space in use as described in the current list of song records 29 in the master catalog 23. The beginning address of this available storage space is placed in the song address field 37 of the new song record 29. Thereafter, at a block 69, the host computer 21 provides a read enable signal on a bus 50 to either the reader 51 or reader/converter 55. Either the reader 51 or reader/converter 55 responds by reading and sending digital data representing the new song to the host computer 21 via the bus 50. Utilizing a bus 54, the host computer 21 forwards the digital data received to the compression circuit 52, receives compressed digital data from the compression circuit 52 and writes the compressed digital data into the bulk storage unit 25. At a block 71, upon reaching the end of the digital data output, i.e., the end of a song, the host computer 21 writes the byte length of the digital output into the song size field 39.

The host computer 21 at a block 73 prompts the user to load a picture, such as an album cover, into the graphics scanner 53. At a block 75, the host computer 21 identifies further available storage space in the bulk storage unit 25 and places the beginning address thereof into the graphics address field 41. Once a picture is loaded, the host computer 21 at block 77, using the bus 50, provides a read enable signal to the scanner 53 which responds via bus 50 by digitizing the picture and transferring the digitized output to the host computer 21. At a block 79, using the bus 54, the host computer 21 forwards the digitized data of the picture to the compression circuit 52, receives compressed digitized data from the compression circuit 52, and writes the compressed digitized data into the bulk storage unit 25. At a block 81, upon reaching the end of the digitized output, i.e., the end of the picture, the host computer 21 places the byte length of the digitized output into the graphics size field 43. Finally, at a block 83, the host computer 21 sets the play count field 45 to zero (0). This flow-chart is repeated as necessary until all of the new songs are added to the master library 27. It is noted that the operator can also delete, modify or replace any specific song record 29 found in the master catalog 23 and master library 27.

Returning to FIG. 1, each computer jukebox 13 plays songs and displays graphics which are stored locally in the large-volume data storage unit 93. The storage unit 93 of the jukebox 13 contains a subset of the songs found in the master library 27 maintained by the central management

system 11. More specifically, the storage unit 93 of the jukebox 13 stores a song library 91 which is a corresponding subset of the master library 27. The song library 91 contains all of the currently available song selections and associated pictorial graphics for the jukebox 13. The storage unit 93 also stores a catalog 95 that is an index into the local song library 91. The catalog 95 is similar to the master catalog 23. Both the song library 91 and associated catalog 95 are monitored and updated by the central management system 11 as needed via the transmission link 15. The jukebox 13 permits this monitoring and updating at any time with no impact on its end-user performance.

The jukebox 13 also includes a processing circuit 121 which contains a microprocessor 121A, read only memory (ROM) 121B and random access memory (RAM) 121C. As in conventional computer systems, the microprocessor 121A operates in accordance with the software program contained in the ROM 121B and utilizes the RAM 121C for scratch-pad memory. The processing circuit 121 may also contain a decompression circuit (not shown) or may perform decompression using a software algorithm stored in the ROM 121B depending on the type of data compression scheme used by the central management system 11. In either case, decompression is necessary to decompress the compressed data received from the central control system 11 so that the song can be played and associated graphics image displayed.

The processing circuit 121 controls the operation and flow of data into and out of the jukebox 13 through the modem 19 via a bus 124. Using the bus 124, the processing circuit 121 also controls a visual display 125, one or more selection keys 123 and a coin/bill detector 126 to provide the user with an interactive interface to the jukebox 13. The keys 123 provide signals representing user inputs such as displayed song selection. The display 125 displays alpha numeric information as well as pictorial graphics to interface with the user. The coin/bill detector 126 is responsive to one or more coins or bills input by a customer to determine whether the proper amount of money has been input and to provide money detect signals coupled to the processing circuit. The processing circuit 121 further controls, via the bus 124, an audio reproduction circuit 127 coupled to a speaker system 129 along a bus 131 to provide an audio output to the user.

FIGS. 4A and 4B are flow-charts illustrating the software procedures respectively used by the central management system 11 and the jukebox 13 in managing the song library 91 of the jukebox 13. At a block 101, the central management system 11 initiates communication with one of the jukeboxes 13 via the transmission link 15. Immediately thereafter, at a block 103, the management system 11 requests that the jukebox data be sent including a copy of the catalog 95. At a corresponding block 141, the jukebox 13 responds by sending the copy of the catalog file as well as other jukebox data including total money intake over a period of time. The data sent from the jukebox to the management station may also include customer requests for new songs, a customer utilizing the display and keyboard of the jukebox 13 to enter song request data as discussed below. Thereafter, at a block 105, by examining each play count field 45 in the copy of the catalog 95 received, the management system 11 determines the royalty amount due per song and whether to replace or update specific song entries stored in the jukebox 13. The management system 11 also determines the total money intake from the play count information and compares this value to the total money intake value received from the jukebox to provide a check. At an inquiry block 107, if no replacements are necessary, the management system 11 branches to a block 109 to terminate communication with the jukebox 13. If, however, replacements are necessary, the management system 11 branches to download the changes. Particularly, at a block 111, the management system 11 downloads to the jukebox 13 the song records 29 of both the song to be replaced and the replacement song. In a corresponding block 143, the jukebox 13 replaces the song record 29 in the catalog 95. Thereafter, the jukebox 13 identifies available storage space in the storage unit 93 based on the song size field 39 of the new song, and writes the beginning address thereof into the song address field 37 in a corresponding block 145. Afterwards, at a block 113, the central management system 11 downloads the compressed digital data of the song to the jukebox 13. At a corresponding block 147, the jukebox 13 receives and writes the data into the song library 91. Next, at a corresponding block 149, the jukebox 13 identifies available storage space in the storage unit 93 based on the graphics size field 43, and writes the beginning address thereof into the graphics address field 41 of the new song. Thereafter, at a block 115, the management system 11 downloads the compressed digitized data of the picture to the jukebox 13. The jukebox, at a corresponding block 151, receives and writes the data into the song library 91. Finally, the block 107 is again encountered. If further replacements need to be made, the blocks 111, 113 and 115 are repeated until complete. At a corresponding block 153, the jukebox similarly repeats the corresponding blocks 143 through 151 until no further replacements need to be made. A further block placed immediately above the block 107 may also be used, wherein the central management system 11 sends a delete, modify, add or replace command to the jukebox 13 before downloading into the song library 93. In this way, the management system 11 receives additional flexibility in updating the jukebox 13. It is noted that the jukebox 13 can also initiate communications with the management system 11 at predetermined times or if the jukebox determines that an event has occurred that the management system 11 should be aware of.

FIG. 5 is a flow-chart illustrating the specific operation of the processing circuit 121 of the jukebox 13 in interfacing with the user. At a block 161, if no song selection is playing, the processing circuit 121 operates in a user attract mode, displaying a random sequence of available graphic images on the visual display 125. More particularly, the processing circuit 121 randomly selects a starting address of the compressed graphics data from the available song records 29 in the catalog 95. From that starting address, the circuit 121 retrieves the data from the song library 91 via the bus 124. The circuit 121 decompresses and transfers the data along the bus 124 to the visual display 125 for display. Thereafter, the circuit 121 again randomly selects a starting address of available graphics data and this cycle repeats. If, however, a song selection is being played when the block 161 is encountered, the attract mode sequencing does not occur. Instead, the circuit 121 displays the associated graphics image of the song being played on the display 125. During the attract mode the processing circuit 121 may also control the display 125 to present a prompt requesting customers to enter new song requests. The new song request data entered by a customer using the keyboard is stored and uploaded to the management system 11 to aid the system 11 in determining whether new song data should be downloaded to the jukebox.

At a block 163, the processing circuit 121 responds to a signal indicating user interest from the selection keys 123 by providing on the display 125 those music categories, i.e., country, rock, jazz, etc., found in the catalog 95. At a block

165, the circuit 121 responds to a signal indicating a category selection from the keys 123 by providing on the display 125 an index of available songs, arranged alphabetically either by artist or title, which can be scrolled and selected using the keys 123. Upon selection of a specific song, the circuit 121 encounters an inquiry block 167. If at the block 167 the circuit 121 determines from the signal received from the money detector 125 that a sufficient amount of money has not been deposited, a branch to a block 169 occurs. At the block 169, using the display 125, the circuit 121 prompts the user to deposit money into the coin/bill detector 126, then branches back to the block 161. However, if sufficient moneys have been deposited, the circuit 121 branches to a block 171 wherein the circuit 121 updates the play count field of the selected song's record in the catalog file 95 and money intake data stored in the memory. The circuit also places the song record 29 corresponding to the selected song into a queue of song records to be played. After the selection is queued, the circuit 121 encounters an inquiry block 153. If the total number of selections purchased have been selected, the circuit 121 branches back to the block 161. Otherwise, if further purchased selections are forthcoming, the circuit 121 branches back to the block 163. In this manner, all of the selections are made and placed in the queue. Upon completion of playing a queued-up, selected song, the circuit 121 removes the corresponding song record 29 from the queue, selects the next song record in the queue, begins to play that next song, and executes the block 161. It is noted that the song queue can be displayed on the display 125 in order to show customers what songs have already been selected prior to making their selection.

More specifically, referring back to FIG. 1, once a specific song has been selected and queued-up, the processing circuit 121 first identifies the beginning address of the compressed digital data from the song address field 37 of the song record 29 in the queue. From this address, using the bus 124, the circuit 121 reads the compressed digital data out of the storage unit 93, decompresses that data, and sends the decompressed digital data to the audio reproduction circuit 127. The audio reproduction circuit 127, commonly found in CDROM readers and associated amplifiers, converts the digital data to an analog signal which is amplified and used to drive the speaker system 129 via the bus 131. After a selected song finishes playing, the processing circuit 121 deletes the song record 29 of the selected song from the queue, increments the play count field 45 associated with that song in the catalog 95, and begins playing the next selected song in the queue if any exists. The process set forth in the flow-chart detailed in FIG. 5 is then repeated.

While the present invention is being described and illustrated in accordance with the preferred embodiment enabling new recordings and computer usage data to be transferred via the transmission line 15, the monitoring and updating may also be directly transferred. In this latter embodiment, routemen physically visit the location of each computer jukebox 13. During these visits, the routemen carry a portable management system 181 which has only a subset of potential replacement songs stored in a subset library and associated catalog (not shown) on a portable bulk storage unit 183. The subset library is loaded by the portable management system 181 onto the portable bulk storage unit 183 either directly from the bulk storage unit 25 or indirectly as is initially done by the central management system 11 (described above). In all other ways, the portable management system 181 operates the same as the central management system 11, collecting the catalog 95 of each jukebox 13 and updating or replacing as necessary. To accomplish this, the portable management system 181 communicates at a very high rate of speed with the jukebox 13 via a parallel communication link 185 and a direct memory access (DMA) link 187.

Additionally, the routemen may simply exchange the "old" storage unit 93 with a pre-loaded storage unit (not shown). The central management system 11 may later read the "old" storage unit 93 to gather the information from the catalog 95. Such an embodiment still enjoys the other advantages made possible by the computer jukeboxes 13 described herein.

Additionally, it is to be understood that the embodiments of the present invention described hereinabove are merely illustrative and that other modifications and adaptations may be made without departing from the scope of the appended claims.

We claim:

1. An improved computer jukebox for playing songs selected by users of the computer jukebox from a library of songs that have been digitally compressed and stored in the computer jukebox, where the selectable songs stored in the computer jukebox are capable of being updated upon the receipt of compressed song digital data, which represents at least one song, as well as song identity data, which represents the identity of each such song, the computer jukebox comprising:

a communication interface for receiving the compressed song digital data and the song identity data;

computer memory storing the received compressed song data and the received song identity data for each of the songs stored;

means for displaying, to prospective users of the computer jukebox, information that identifies the songs for which song digital data is stored in the computer memory and that is based on song identity data;

means for permitting a user of the computer jukebox to select at least one song to be played on the computer jukebox from the song identity information displayed on the display means and for generating a signal representing the song selected by the user;

at least one audio speaker;

means for decompressing compressed song digital data;

a digital to analog converter coupled between the decompressing means and the audio speaker to convert song digital data to analog signal coupled to the speaker; and

means for processing and accessing song digital data, in response to a song selection signal, from the computer memory so that the accessed song digital data corresponds to the song selected by the user and for applying the accessed song digital data to the decompressing means and to the digital to analog converter so that the song selected is played on the computer jukebox as a result of the corresponding stored song digital data being decompressed and converted by the decompression means and the digital to analog converters, respectively, with the processing means also being responsive to compressed song digital data and to song identity data, which may be received by the communication interface of the computer jukebox, to control the storage of the received compressed song digital data and the received song identity data in the computer memory so as to update the library of songs stored in the computer jukebox.

2. The computer jukebox as recited in claim 1 wherein the processing means is responsive to the catalog file data to

control the information displayed on the display means to represent the updated jukebox song selections; wherein the processing means stores in the computer memory song usage data generated upon the playing of a song; and wherein the communication interface includes means for transmitting song usage data under the control of the processing means.

3. The computer jukebox as recited in claim 1 wherein digital data received by communication interface may also includes digital data representing pictorial graphics; and wherein the graphics digital data is compressed when received by the communication interface of the computer jukebox.

4. The computer jukebox as recited in claim 3 wherein the graphics digital data represent song associated pictorial graphics; and wherein when no song is playing on the computer jukebox, the processing means operates the display means in a user attract mode so that a song associated graphic images, corresponding to song digital data stored in the computer memory, are displayed on the display means.

5. The computer jukebox as recited in claim 1 wherein the communication interface is a communication interface selected from a group consisting of a modem, a radio frequency receiver or a direct communication interface port; and wherein the song identity data is also compressed when received by communication interface of the computer jukebox.

6. The computer jukebox as recited in claim 1 further including a money intake detection device, with the money intake detection device generating a money detection signal upon the receipt of money intake of a predetermined amount on behalf of the computer jukebox; wherein the processing means is responsive to the money detector signal to update a money intake memory location in the computer memory, with the money intake memory location storing data representing the total intake of money for the computer jukebox over a period of time; and wherein the communication interface including means for transmitting the money intake data under the control of the processing means.

7. An improved computer jukebox network comprising: a plurality of computer jukeboxes where each of the computer jukeboxes is capable of playing songs selected by users of the computer jukebox from a library of songs that have been digitally compressed and stored in the computer jukebox and where the selectable songs on the computer jukebox are capable of being updated upon the receipt of compressed song digital data, which represents at least one song, as well as song identity data, which represents the identity of each such song; and a management station for updating the library of songs in each of the plurality of computer jukeboxes,

with each computer jukebox including:

a communication interface for receiving compressed song digital data and song identity data;

computer memory storing the received compressed song digital data and the received song identity data for each of the songs stored;

means for displaying, to prospective users of the computer jukebox, information that identifies the songs for which song digital data is stored in the computer memory and that is based on song identity data;

means for permitting a user of the computer jukebox to select at least one song to be played on the computer jukebox from the song identity information displayed on the display means and for generating a signal representing the song selected by the user;

at least one audio speaker;

means for decompressing compressed song digital data;

a digital to analog converter coupled between the decompressing means and the audio speaker to convert song digital data to analog signal coupled to the speakers;

means for processing and for accessing song digital data, in response to a song selection signal, from the computer memory so that the accessed song digital data corresponds to the song selected by the user and for applying the accessed song digital data to the decompressing means and to the digital to analog converter so that the song selected is played on the computer jukebox as a result of the corresponding stored song digital data being decompressed and converted by the decompression means and the digital to analog converter, respectively, with the processing means also being responsive to compressed song digital data and to song identity digital data, which may be received by the communication interface of the computer jukebox, to control the storage of the received compressed song digital data and the received song identity data in the computer memory so as to update the library of songs stored in the computer jukebox; and

with the management station including:

a communication interface for receiving and transmitting compressed song digital data, song identity data and other compressed digital data; and means for processing and controlling: the storage of song digital data, representing a set of songs, and song identity data, representing the identity of the set of songs, in a storage unit; the compression of song digital data; and the transmission of a subset of compressed song digital data and song identity data for the subset to a computer jukebox to update the library of songs in the computer jukebox;

the management station being operative for selectively transmitting the song digital data and song identity data to different ones of the plurality of computer jukeboxes.

8. The jukebox network as recited in claim 7 wherein the management station is remote from the plurality of computer jukeboxes; and wherein the communication interface of each computer jukebox provides a two way communication link between the management station and the computer jukebox.

9. The jukebox network as recited in claim 7 wherein said management station is portable; and wherein the communication interface of the management station and a computer jukebox includes a direct communication link interface port.

10. The jukebox network recited in claim 7 wherein the processing means of each computer jukebox is responsive to the catalog file data of the computer jukebox to control the information displayed on the display means of the computer jukebox to represent the updated library of songs stored in the computer jukebox.

11. The jukebox network recited in claim 7 wherein each of the processing means of each of the computer jukeboxes stores song usage data in the computer memory of the computer jukebox generated upon the playing of a song; wherein the communication interface of the computer jukebox includes means for transmitting the song usage data, under the control of the processing means of the computer jukebox, to the management station; and wherein compressed digital data received by a computer jukebox communication interface from the management station may also include compressed digital data representing song associated to pictorial graphics.

12. The jukebox network as recited in claim 11 wherein the processing means of the management station processes the song usage data communicated to the management station by a computer jukebox to determine which songs should be replaced on the computer jukebox; and wherein the song identity data is also received by the communication interface of each jukebox computer as compressed digital data.

13. The jukebox network recited in claim 7 wherein each computer jukebox further including a money intake detection device, with the money intake detection device generating a money detection signal upon the receipt of money intake of a predetermined amount on behalf of the computer jukebox; wherein the processing means of the computer jukebox is responsive to the money detector signal to update a money intake memory location in the computer memory of the computer jukebox, with the money intake memory location storing data representing the total intake of money for the computer jukebox over a period of time; and wherein the communication interface of the computer jukebox includes means for transmitting the money intake data to the management station.

* * * * *

EXHIBIT C

US005848398A

United States Patent [19]

Martin et al.

[11] **Patent Number: 5,848,398**

[45] **Date of Patent: Dec. 8, 1998**

[54] **SYSTEM FOR MANAGING A PLURALITY OF COMPUTER JUKEBOXES**

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[73] Assignee: **Arachnid, Inc.**, Rockford, Ill.

[21] Appl. No.: **638,022**

[22] Filed: **Apr. 25, 1996**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 584,253, Jan. 11, 1996, Pat. No. 5,781,889, which is a continuation of Ser. No. 268,782, Jun. 30, 1994, abandoned, which is a continuation of Ser. No. 538,981, Jun. 15, 1990, abandoned.

[51] **Int. Cl.**[6] **G06F 17/60**

[52] **U.S. Cl.** **705/14**; 364/479.04

[58] **Field of Search** 705/1, 10, 14; 369/32; 235/381; 364/479.01, 479.04, 479.06, 479.02, 407.03

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Assistant Examiner—Hani M. Kazimi
Attorney, Agent, or Firm—McAndrews, Held, & Malloy, Ltd.

[57] **ABSTRACT**

A method and apparatus as shown for managing a plurality of computer jukeboxes at different locations from a central station. Each jukebox includes processor means for controlling the computer jukebox, storage and retrieval means for data, display means for selection menus, audio production means for playing musical records, and a user interface enabling patrons to communicate with the processor means. The central station can be used to download musical recording data to each computer jukebox, and each computer jukebox can upload usage data to the central station.

11 Claims, 5 Drawing Sheets

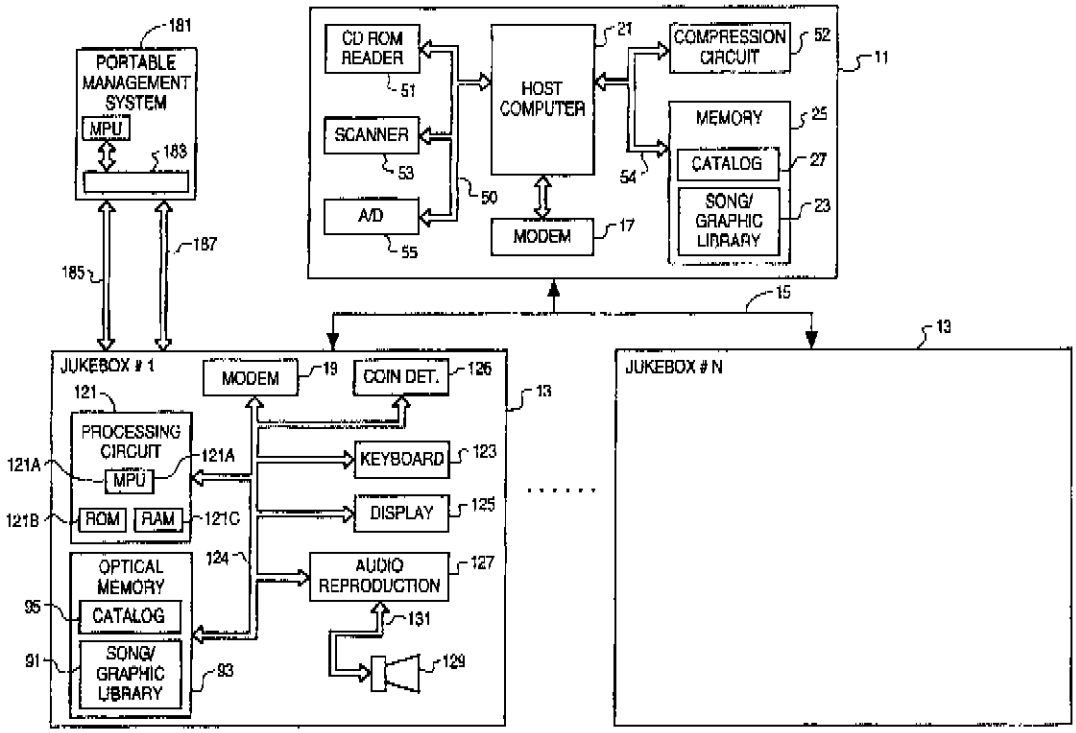


Fig. 1

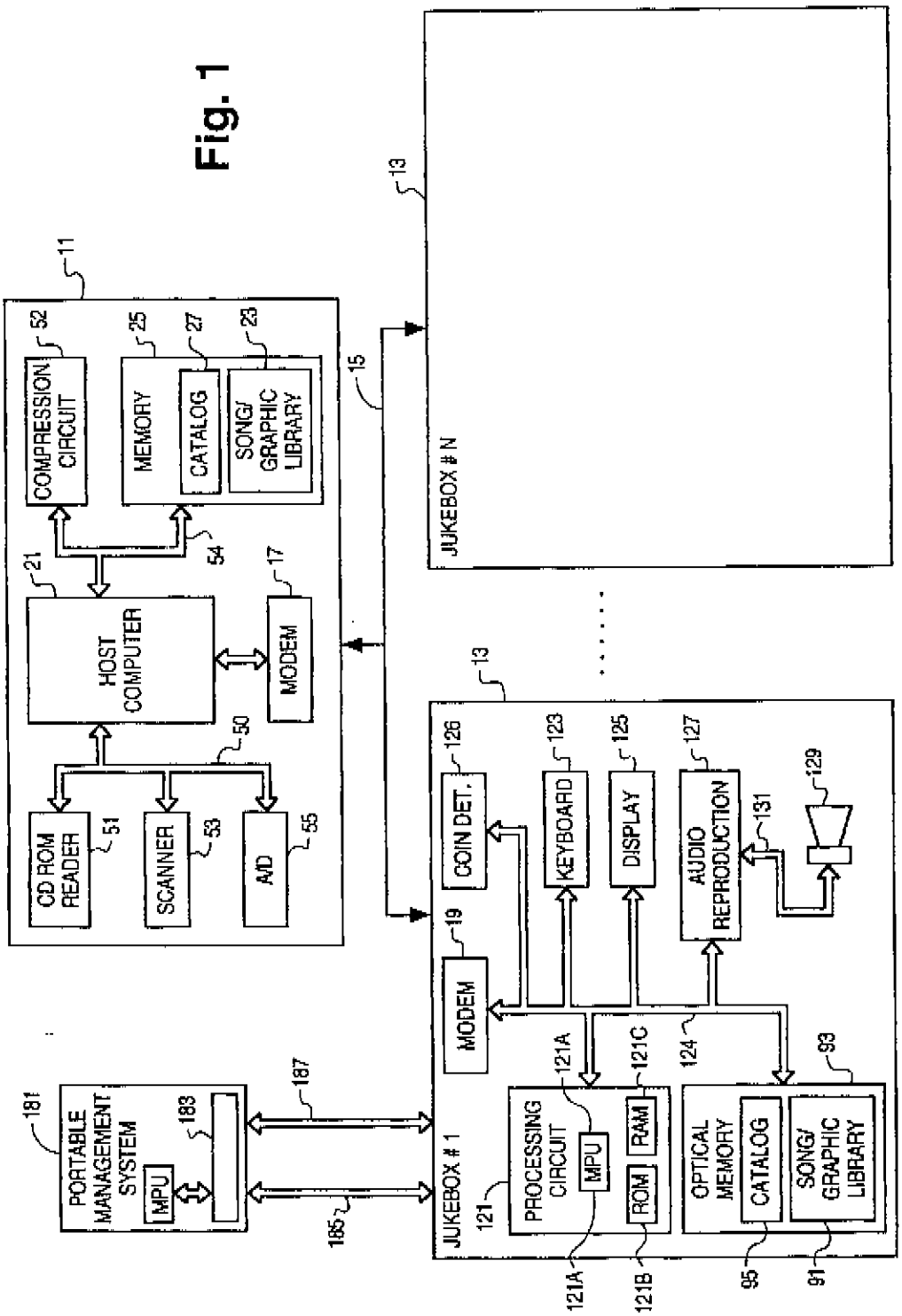

JUKEBOX # N
13
15
11
COMPRESSION CIRCUIT
52
MEMORY
25
CATALOG
27
SONG/ GRAPHIC LIBRARY
23
54
HOST COMPUTER
21
MODEM
17
50
CD ROM READER
51
SCANNER
53
A/D
55
13
COIN DET.
126
KEYBOARD
123
DISPLAY
125
AUDIO REPRODUCTION
127
131
129
MODEM
19
JUKEBOX # 1
121
PROCESSING CIRCUIT
MPU
ROM
RAM
121A
121C
124
OPTICAL MEMORY
CATALOG
SONG/ GRAPHIC LIBRARY
93
95
91
121A
121B
PORTABLE MANAGEMENT SYSTEM
MPU
181
183
187
185

Fig. 2

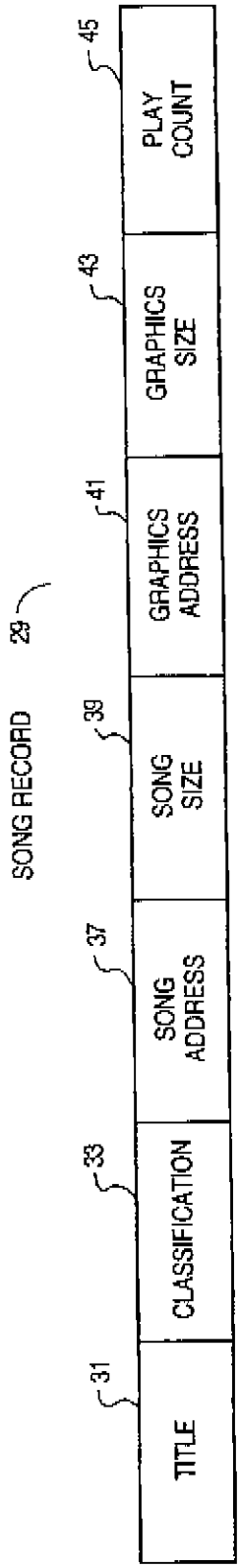

SONG RECORD
29
31
TITLE
33
CLASSIFICATION
37
SONG ADDRESS
39
SONG SIZE
41
GRAPHICS ADDRESS
43
GRAPHICS SIZE
45
PLAY COUNT

Fig. 3

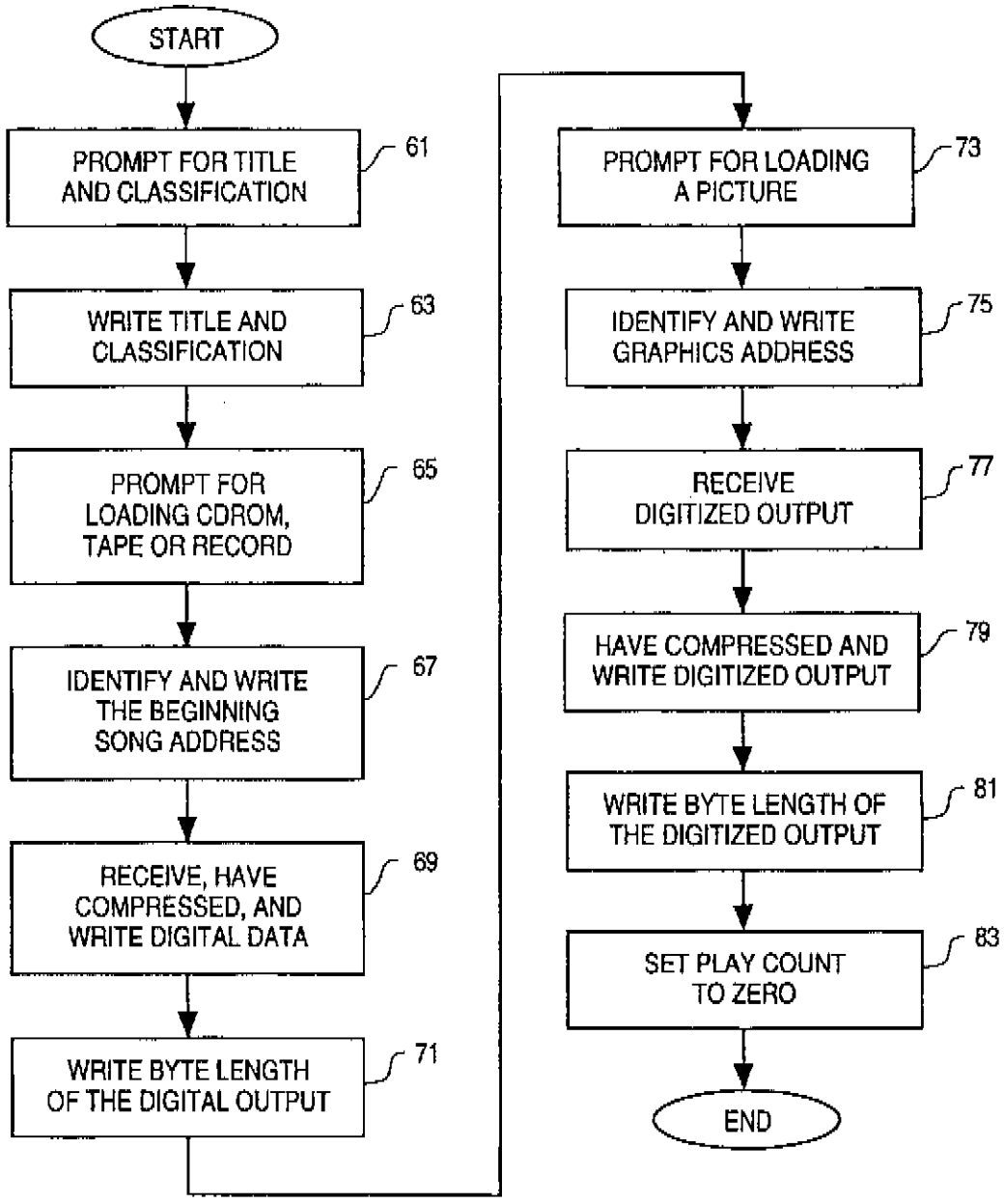

START
PROMPT FOR TITLE AND CLASSIFICATION
61
WRITE TITLE AND CLASSIFICATION
63
PROMPT FOR LOADING CDROM, TAPE OR RECORD
65
IDENTIFY AND WRITE THE BEGINNING SONG ADDRESS
67
RECEIVE, HAVE COMPRESSED, AND WRITE DIGITAL DATA
69
WRITE BYTE LENGTH OF THE DIGITAL OUTPUT
71
PROMPT FOR LOADING A PICTURE
73
IDENTIFY AND WRITE GRAPHICS ADDRESS
75
RECEIVE DIGITIZED OUTPUT
77
HAVE COMPRESSED AND WRITE DIGITIZED OUTPUT
79
WRITE BYTE LENGTH OF THE DIGITIZED OUTPUT
81
SET PLAY COUNT TO ZERO
83
END

Fig. 4A

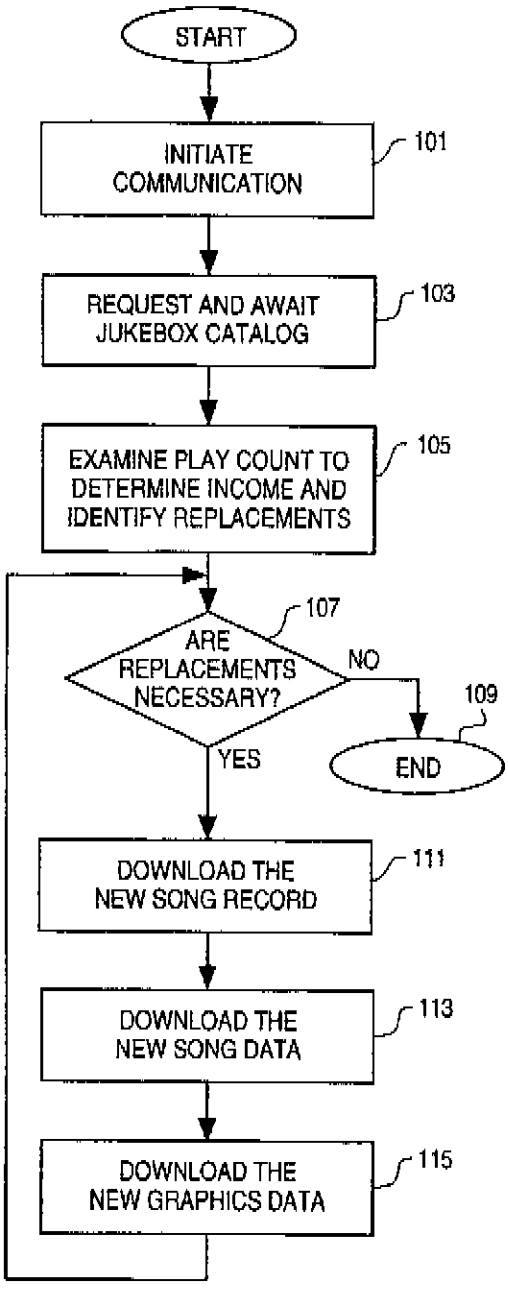

START
INITIATE COMMUNICATION
101
REQUEST AND AWAIT JUKEBOX CATALOG
103
EXAMINE PLAY COUNT TO DETERMINE INCOME AND IDENTIFY REPLACEMENTS
105
ARE REPLACEMENTS NECESSARY?
107
NO
YES
END
109
DOWNLOAD THE NEW SONG RECORD
111
DOWNLOAD THE NEW SONG DATA
113
DOWNLOAD THE NEW GRAPHICS DATA
115

Fig. 4B

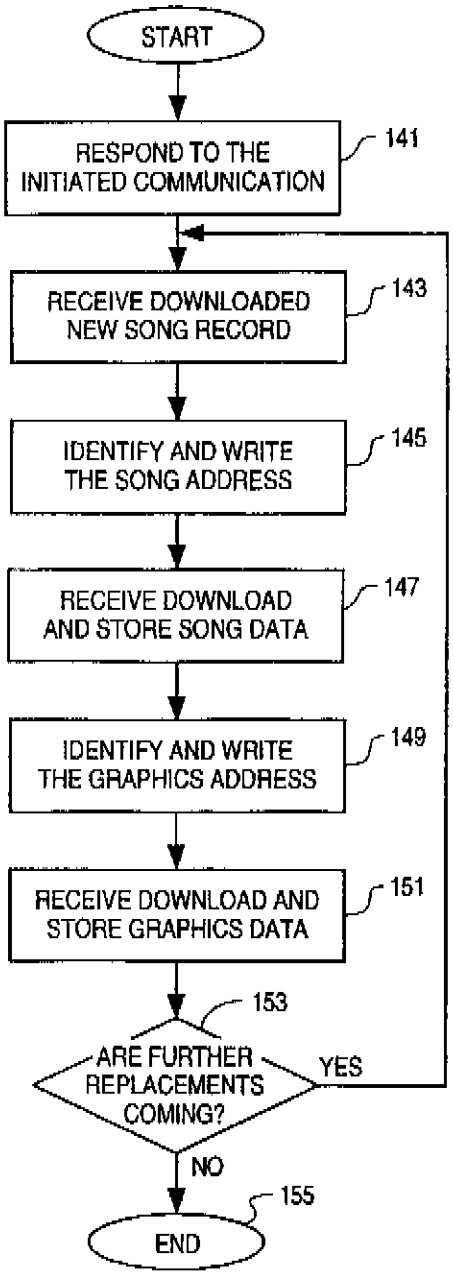
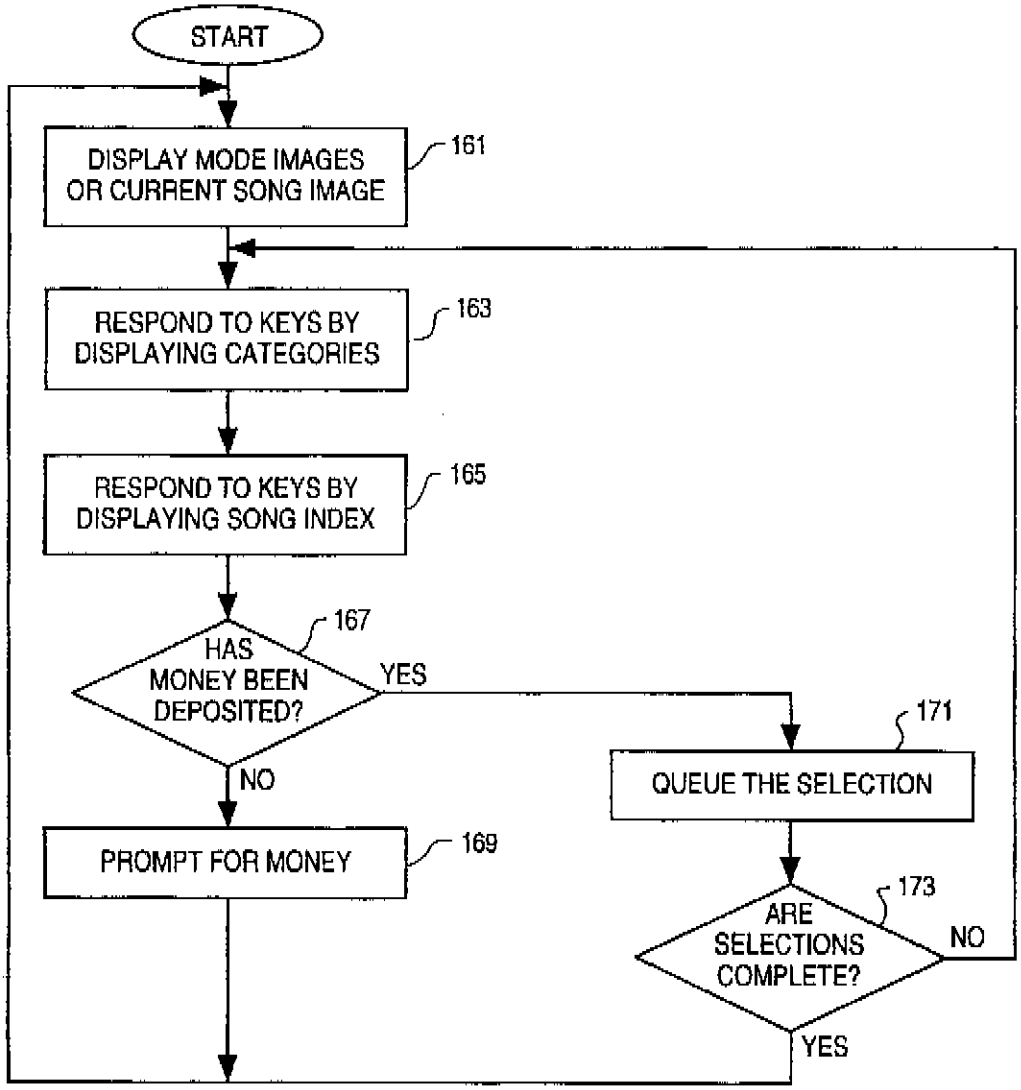

START
RESPOND TO THE INITIATED COMMUNICATION
141
RECEIVE DOWNLOADED NEW SONG RECORD
143
IDENTIFY AND WRITE THE SONG ADDRESS
145
RECEIVE DOWNLOAD AND STORE SONG DATA
147
IDENTIFY AND WRITE THE GRAPHICS ADDRESS
149
RECEIVE DOWNLOAD AND STORE GRAPHICS DATA
151
ARE FURTHER REPLACEMENTS COMING?
153
YES
NO
END
155

Fig. 5


START
DISPLAY MODE IMAGES OR CURRENT SONG IMAGE
161
RESPOND TO KEYS BY DISPLAYING CATEGORIES
163
RESPOND TO KEYS BY DISPLAYING SONG INDEX
165
HAS MONEY BEEN DEPOSITED?
167
YES
NO
PROMPT FOR MONEY
169
QUEUE THE SELECTION
171
ARE SELECTIONS COMPLETE?
173
NO
YES

SYSTEM FOR MANAGING A PLURALITY OF COMPUTER JUKEBOXES

This is a continuation-in-part of U.S. patent application Ser. No. 08/584,253, filed Jan. 11, 1996 now U.S. Pat. No. 5,781,889, which is a continuation of U.S. patent application Ser. No. 08/268,782, filed Jun. 30, 1994 now abandoned, which is a continuation of U.S. patent application Ser. No. 07/538,981, filed Jun. 15, 1990 now abandoned.

FIELD OF THE INVENTION

The present invention relates generally to a jukebox system, and more particularly to such a system including one or more computer jukeboxes that can be managed from a remote location.

BACKGROUND OF THE INVENTION

Heretofore, an assortment of musical recordings found in a jukebox consists of a plurality of records, each record containing a specific recording. Traditionally, these records are grooved phonograph records. After a patron makes a selection, the selected phonograph record is mechanically removed from a storage rack within the jukebox, and the phonograph record is placed upon rotating platform. A stylus which is connected to a speaker system is then placed upon the rotating phonograph record, resulting in the phonograph record being played by the jukebox. For each selection, a separate phonograph record must be removed from the storage rack in order to be played by the jukebox.

Conventional jukeboxes have also implemented compact disks as means for creating an assortment of musical songs. Compact disks provide the improved sound quality made possible by digital recordings. The same technique, however, is used to play compact disks. A separate compact disk corresponding to each selection must be removed from a storage rack in order for the jukebox to play the selection.

Updating conventional jukeboxes is a costly and time consuming task. Routemen must periodically travel to each jukebox location and replace the existing recordings of each jukebox with up-to-date records. The existing recordings are no longer used by the jukebox once removed, thus making the conventional method wasteful.

Routemen must also travel to each jukebox location to keep a tally of the number of times each musical recording is selected in order to determine royalty fees. It is known to provide a jukebox with a counter that keeps track of the number of times each musical recording is selected, but routemen must still travel to each jukebox location to obtain this information. Such a process requires an excessive number of people to visit each jukebox location periodically and visually read the information off the counter within each jukebox. Since the number of jukeboxes in operation is quite large, the employment of routemen to obtain such data involves a considerable expense. Furthermore, the ever changing nature of the recording industry requires that such data be gathered frequently in order to keep abreast of a continually changing market.

Conventional jukeboxes display a selection menu allowing a patron to select a particular recording that he or she may want to hear. When that song is being played, a video accompanying the song is typically displayed on the screen. However, when the jukebox is not being used either the selection menu is still continually displayed or the screen is blank.

OBJECTS AND SUMMARY OF THE INVENTION

Accordingly, it is a primary object of the present invention to provide a method and apparatus for managing a plurality of computer jukeboxes which is capable of eliminating the necessity for routemen to change records in the jukeboxes. The computer jukeboxes store recordings in memory, thus enabling routemen to simply load new recordings into the memory of each computer jukebox.

Another object of the present invention is to eliminate a necessity for routemen by enabling new recordings and selection menus to be downloaded to each computer jukebox via a transmission link. In that regard, it is an object of the present invention to provide a method and apparatus which eliminates the material waste usually associated with updating jukeboxes. Instead of throwing away old recordings and replacing them with new ones, as is the conventional procedure, the present invention eliminates this waste by enabling new recordings to simply be downloaded into the memory of each computer jukebox. The old recordings are simply erased, if necessary.

Another object of the present invention is to provide a method and apparatus which is capable of remotely obtaining jukebox usage data, thus eliminating a necessity for routemen to do this task. The present invention utilizes a computer jukebox, which as part of its software programming, stores the number of times each musical recording is played and the number of credits that have been awarded. This data is uploaded to a central control device via a transmission link.

An additional object of the present invention is to provide a method and apparatus utilizing modern computer technology to digitally store and play musical records. The jukebox of the present invention is basically a computer having a sophisticated audio production capability, the computer storing digitized song data in a computer memory. Because conventional jukeboxes maintain compact discs or records in the jukebox, theft of the compact disc/records has been a problem, this problem being eliminated by the present invention's utilization of a computer memory to store the digitized song data.

A further object of the present invention is to provide a method and apparatus capable of being used with the remote management of jukeboxes via public telephone lines without interfering with an establishments' use of their own phone lines.

Still a further object of the present invention is to provide a method and apparatus for downloading and storing advertisements to a computer jukebox, and then running the advertisements on a screen associated with the computer jukebox at specified times. Additionally, the jukebox may also be associated with an electronic game so that advertisements not be run on a screen of the electronic game when the game is not being played.

It is a related object of the present invention to track the number of times a particular advertisement is actually run so that the advertiser can be appropriately billed. This information is uploaded to the central control device via the transmission link.

Other objects, features and advantages of the present invention will be readily apparent from the following description of certain preferred embodiments thereof taken in conjunction with the accompanying drawings, although variations and modifications may be effected without departing from the spirt and scope of the novel concepts of the disclosure.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a block diagram of the computer jukebox system of the present invention;

FIG. 2 is an illustration of the data structure of an individual song record stored in a master library catalog illustrated in FIG. 1;

FIG. 3 is a flow-chart illustrating the procedure for storing new songs in a bulk storage unit illustrated in FIG. 1;

FIGS. 4A and B are flow-charts illustrating the software procedures used by the central management system and the jukebox respectively in managing the song library of the jukebox; and

FIG. 5 is a flow-chart illustrating the specific operation of the jukebox in interfacing with a user.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

In accordance with the, present invention as shown in FIG. 1, a central management system **11** monitors and updates the available selection of music at a number of remotely located jukeboxes such as a jukebox **13**. Particularly, the central management system **11** monitors each jukebox **13** to determine the number of times each song has been played. From these numbers, the central management system **11** can calculate the royalty payments that are due. More importantly, the central management system **11** can identify those specific songs which need to be replaced in each jukebox on an individual basis, the central management system communicating replacement songs to each jukebox **13** to update the available music selection therein as needed.

Each jukebox **13** is basically a computer having sophisticated audio production capability wherein each computer jukebox **13** is programmed to play songs that have been digitally compressed and stored in a large-volume data storage unit **93**. The storage unit **93** may be an optical memory or any other available large volume nonvolatile computer memory that provides both read and write access.

The central management system **11** communicates with each computer jukebox **13** via a transmission link **15**. The central management system **11** and each jukebox **13** use respective modems **17** and **19** to maintain serial communication on the transmission link **15**. The transmission link **15** may be a cable system such as public or private telephone lines or the like. However, the modems **17** and **19** may be replaced with RF (radio frequency) transceivers and associated antennas. In the latter instance the transmission link **15** is an RF link.

Additionally, in another embodiment, an audio codec may be included as part of the central management system **11**. The audio codec receives analog audio input, converts it into digital bytes, and then compresses these bytes via known audio compression methods for economic transmission, such as by the commercially available "MUSICAM®" algorithm. The compressed digital audio can than be transmitted to the jukebox **13** by the transmission link **15** which, in addition to the above described system such as telephone lines, cable, RF links or modems, can include transmission via a sub carrier to utilize certain FM channels. In this embodiment, the audio information is transmitted in packets of a predetermined length. Each packet is organized such that a header is transmitted first. The header is followed by the compressed audio data and then by a trailer containing an error detection method to ensure that the audio was transferred properly.

In another embodiment, the central management system **11** transmits the compressed audio data via satellite or cellular telephone systems. In either of these cases, the transmission link **15** is a satellite uplink or a cellular uplink.

In yet another embodiment, the audio information may be stored on a portable infra red device, and the information may be transmitted from the device via infra red rays to the computer jukebox **13**. As discussed in more detail below, the central management system **11** can transmit other information, specifically video and graphic information via the transmission link **15** to the computer jukebox **13**.

Specifically, the central management system **11** includes a host computer **21** which maintains a master library **23** of songs and associated graphics which are stored in a compressed digital form in a bulk storage unit **25**. The bulk storage unit **25** is capable of storing vast amounts of digital data, and may take the form of a read-write optical storage device. The host computer **21** indexes the master library **23** by using a master catalog **27** which is also maintained in the bulk storage unit **25**.

The master catalog **27** stores a song record **29**, as illustrated in FIG. 2, for each song stored in the master library **23**. Each song record **29** associates information in the following fields: a) title field **31**, containing the name of the song; b) a classification field **33**, containing the type of music, i.e., country, pop, jazz, classical, etc.; c) a song address field **37**, containing the beginning address in the bulk storage unit **25** of the compressed digital data of the song; d) a song size field **39**, containing the number of bytes in length of the compressed digital data; e) a graphics address field **41**, containing the beginning address in the bulk storage unit **25** of the compressed digital data of a graphics image, if any, to be associated with the song; f) a graphics size field **43**, containing the number of bytes in length of the compressed graphics image; and g) a play count field **45**, containing a count which indicates the number of times this specific song has been played. By parsing the master catalog **27**, the host computer **21** can quickly locate all available information relating to any available song. The master catalog **27** also stores data particular to each jukebox such as the number of times each available song has been played, the coin intake for that jukebox, etc. The data particular to each jukebox is uploaded from the jukebox to the central management system **11** to update the master catalog **27**.

Returning to FIG. 1, in order to add to the master library **23** and associated master catalog **27**, the host computer **21** receives, has compressed and stores in the bulk storage unit **25** digital data representing the new song and associated pictorial graphics. The host computer **21** receives the digital data for storage from three sources: 1) a compact disc read only memory (CDROM) reader **51**, which reads CDROMS; 2) a graphics scanner **53**, which digitizes pictorial graphic images; and 3) an analog to digital (A/D) reader/converter **55**, which reads analog data from both tapes and records and then converts the analog data into digital data. A compression circuit **52** using an adaptive-delta, pulse-code-modulation compression scheme compresses the digital data before it is stored. Other compression schemes may also be used. The compression circuit **52** might also be fully replaced by a software algorithm, such as MUSICAM®, which is executed by the host computer **21**.

FIG. 3 more specifically illustrates the operation of the host computer **21** in adding new songs to the master library **23**. At a block **61**, the user is initially prompted by the host computer **21** to enter a new song title and category. The host computer **21** writes this information into the title field **31** and classification field **33** of a new song record **29** at a block **63**. Next, at a block **65**, the host computer **21** prompts the user to place either a CDROM into the reader **51** or a record or tape into the reader/converter **55**. After the user has completed this placement, at a block **67** the host computer **21**

identifies available storage space in the bulk storage unit **25** by analyzing the space in use as described in the current list of song records **29** in the master catalog **23**. The beginning address of this available storage space is placed in the song address field **37** of the new song record **29**. Thereafter, at a block **69**, the host computer **21** provides a read enable signal on a bus **50** to either the reader **51** or reader/converter **55**. Either the reader **51** or reader/converter **55** responds by reading and sending digital data representing the new song to the host computer **21** via the bus **50**. Utilizing a bus **54**, the host computer **21** forwards the digital data received to the compression circuit **52**, receives compressed digital data from the compression circuit **52** and writes the compressed digital data into the bulk storage unit **25**. At a block **71**, upon reaching the end of the digital data output, i.e., the end of a song, the host computer **21** writes the byte length of the digital output into the song size field **39**.

The host computer **21** at a block **73** prompts the user to load a picture, such as an album cover, into the graphics scanner **53**. At a block **75**, the host computer **21** identifies further available storage space in the bulk storage unit **25** and places the beginning address thereof into the graphics address field **41**. Once a picture is loaded, the host computer **21** at block **77**, using the bus **50**, provides a read enable signal to the scanner **53** which responds via bus **50** by digitizing the picture and transferring the digitized output to the host computer **21**. At a block **79**, using the bus **54**, the host computer **21** forwards the digitized data of the picture to the compression circuit **52**, receives compressed digitized data from the compression circuit **52**, and writes the compressed digitized data into the bulk storage unit **25**. At a block **81**, upon reaching the end of the digitized output, i.e., the end of the picture, the host computer **21** places the byte length of the digitized output into the graphics size field **43**. Finally, at a block **83**, the host computer **21** sets the play count field **45** to zero (0). This flow-chart is repeated as necessary until all of the new songs are added to the master library **27**. It is noted that the operator can also delete, modify or replace any specific song record **29** found in the master catalog **23** and master library **27**.

Returning to FIG. **1**, each computer jukebox **13** plays songs and displays graphics which are stored locally in the large-volume data storage unit **93**. The storage unit **93** of the jukebox **13** contains a subset of the songs found in the master library **27** maintained by the central management system **11**. More specifically, the storage unit **93** of the jukebox **13** stores a song library **91** which is a corresponding subset of the master library **27**. The song library **91** contains all of the currently available song selections and associated pictorial graphics for the jukebox **13**. The storage unit **93** also stores a catalog **95** that is an index into the local song library **91**. The catalog **95** is similar to the master catalog **23**. Both the song library **91** and associated catalog **95** are monitored and updated by the central management system **11** as needed via the transmission link **15**. The jukebox **13** permits this monitoring and updating at any time with no impact on its end-user performance.

The jukebox **13** also includes a processing circuit **121** which contains a microprocessor **121A**, read only memory (ROM) **121B** and random access memory (RAM) **121C**. As in conventional computer systems, the microprocessor **121A** operates in accordance with the software program contained in the ROM **121B** and utilizes the RAM **121C** for scratch-pad memory. The processing circuit **121** may also contain a decompression circuit (not shown) or may perform decompression using a software algorithm stored in the ROM **121B** depending on the type of data compression scheme used by the central management system **11**. In either case, decompression is necessary to decompress the compressed data received from the central control system **11** so that the song can be played and associated graphics image displayed.

The processing circuit **121** controls the operation and flow of data into and out of the jukebox **13** through the modem **19** via a bus **124**. Using the bus **124**, the processing circuit **121** also controls a visual display **125**, one or more selection keys **123** and a coin/bill detector **126** to provide the user with an interactive interface to the jukebox **13**. The keys **123** provide signals representing user inputs such as displayed song selection. The display **125** displays alpha numeric information as well as pictorial graphics to interface with the user. The coin/bill detector **126** is responsive to one or more coins or bills input by a customer to determine whether the proper amount of money has been input and to provide money detect signals coupled to the processing circuit. The processing circuit **121** further controls, via the bus **124**, an audio reproduction circuit **127** coupled to a speaker system **129** along a bus **131** to provide an audio output to the user.

FIGS. **4A** and **4B** are flow-charts illustrating the software procedures respectively used by the central management system **11** and the jukebox **13** in managing the song library **91** of the jukebox **13**. At a block **101**, the central management system **11** initiates communication with one of the jukeboxes **13** via the transmission link **15**.

Immediately thereafter, at a block **103**, the management system **11** requests that the jukebox data be sent including a copy of the catalog **95**. At a corresponding block **141**, the jukebox **13** responds by sending the copy of the catalog file as well as other jukebox data including total money intake over a period of time. The data sent from the jukebox to the management station may also include customer requests for new songs, a customer utilizing the display and keyboard of the jukebox **13** to enter song request data as discussed below. Thereafter, at a block **105**, by examining each play count field **45** in the copy of the catalog **95** received, the management system **11** determines the royalty amount due per song and whether to replace or update specific song entries stored in the jukebox **13**. The management system **11** also determines the total money intake from the play count information and compares this value to the total money intake value received from the jukebox to provide a check. At an inquiry block **107**, if no replacements are necessary, the management system **11** branches to a block **109** to terminate communication with the jukebox **13**. If, however, replacements are necessary, the management system **11** branches to download the changes. Particularly, at a block **111**, the management system **11** downloads to the jukebox **13** the song records **29** of both the song to be replaced and the replacement song. In a corresponding block **143**, the jukebox **13** replaces the song record **29** in the catalog **95**.

Thereafter, the jukebox **13** identifies available storage space in the storage unit **93** based on the song size field **39** of the new song, and writes the beginning address thereof into the song address field **37** in a corresponding block **145**. Afterwards, at a block **113**, the central management system **11** downloads the compressed digital data of the song to the jukebox **13**. Afterwards, at a block **113** the central management system **11** downloads the compressed digital data of the song to the jukebox **13**. At a corresponding block **147**, the jukebox **13** receives and writes the data into the song library **91**. Next, at a corresponding block **149**, the jukebox **13** identifies available storage space in the storage unit **93** based on the graphics size field **43**, and writes the beginning address thereof into the graphics address field **41** of the new song. Thereafter, at a block **115**, the management system **11**

downloads the compressed digitized data of the picture to the jukebox **13**. The jukebox, at a corresponding block **151**, receives and writes the data into the song library **91**. Finally, the block **107** is again encountered. If further replacements need to be made, the blocks **111**, **113** and **115** are repeated until complete. At a corresponding block **153**, the jukebox similarly repeats the corresponding blocks **143** through **151** until no further replacements need to be made. A further block placed immediately above the block **107** may also be used, wherein the central management system **11** sends a delete, modify, add or replace command to the jukebox **13** before downloading into the song library **93**. In this way, the management system **11** receives additional flexibility in updating the jukebox **13**. It is noted that the jukebox **13** can also initiate communications with the management system **11** at predetermined times or if the jukebox determines that an event has occurred that the management system **11** should be aware of.

FIG. **5** is a flow-chart illustrating the specific operation of the processing circuit **121** of the jukebox **13** in interfacing with the user. At a block **161**, if no song selection is playing, the processing circuit **121** operates in a user attract mode, displaying a random sequence of available graphic images on the visual display **125**. More particularly, the processing circuit **121** randomly selects a starting address of the compressed graphics data from the available song records **29** in the catalog **95**. From that starting address, the circuit **121** retrieves the data from the song library **91** via the bus **124**. The circuit **121** decompresses and transfers the data along the bus **124** to the visual display **125** for display. Thereafter, the circuit **121** again randomly selects a starting address of available graphics data and this cycle repeats. If, however, a song selection is being played when the block **161** is encountered, the attract mode sequencing does not occur. Instead, the circuit **121** displays the associated graphics image of the song being played on the display **125**. During the attract mode the processing circuit **121** may also control the display **125** to present a prompt requesting customers to enter new song requests. The new song request data entered by a customer using the keyboard is stored and uploaded to the management system **11** to aid the system **11** in determining whether new song data should be downloaded to the jukebox.

At a block **163**, the processing circuit **121** responds to a signal indicating user interest from the selection keys **123** by providing on the display **125** those music categories, i.e., country, rock, jazz, etc., found in the catalog **95**. At a block **165**, the circuit **121** responds to a signal indicating a category selection from the keys **123** by providing on the display **125** an index of available songs, arranged alphabetically either by artist or title, which can be scrolled and selected using the keys **123**. Upon selection of a specific song, the circuit **121** encounters an inquiry block **167**. If at the block **167** the circuit **121** determines from the signal received from the money detector **125** that a sufficient amount of money has not been deposited, a branch to a block **169** occurs. At the block **169**, using the display **125**, the circuit **121** prompts the user to deposit money into the coin/bill detector **126**, then branches back to the block **161**. However, if sufficient moneys have been deposited, the circuit **121** branches to a block **171** wherein the circuit **121** updates the play count field of the selected song's record in the catalog file **95** and money intake data stored in the memory. The circuit also places the song record **29** corresponding to the selected song into a queue of song records to be played. After the selection is queued, the circuit **121** encounters an inquiry block **153**. If the total number of selections purchased have been selected, the circuit **121** branches back to the block **161**. Otherwise, if further purchased selections are forthcoming, the circuit **121** branches back to the block **163**., In this manner, all of the selections are made and placed in the queue. Upon completion of playing a queued-up, selected song, the circuit **121** removes the corresponding song record **29** from the queue, selects the next song record in the queue, begins to play that next song, and executes the block **161**. It is noted that the song queue can be displayed on the display **125** in order to show customers what songs have already been selected prior to making their selection.

More specifically, referring back to FIG. **1**, once a specific song has been selected and queued-up, the processing circuit **121** first identifies the beginning address of the compressed digital data from the song address field **37** of the song record **29** in the queue. From this address, using the bus **124**, the circuit **121** reads the compressed digital data out of the storage unit **93**, decompresses that data, and sends the decompressed digital data to the audio reproduction circuit **127**. The audio reproduction circuit **127**, commonly found in CDROM readers and associated amplifiers, converts the digital data to an analog signal which is amplified and used to drive the speaker system **129** via the bus **131**. After a selected song finishes playing, the processing circuit **121** deletes the song record **29** of the selected song from the queue, increments the play count field **45** associated with that song in the catalog **95**, and begins playing the next selected song in the queue if any exists. The process set forth in the flow-chart detailed in FIG. **5** is then repeated.

While the present invention is being described and illustrated in accordance with the preferred embodiment enabling new recordings and computer usage data to be transferred via the transmission line **15**, the monitoring and updating may also be directly transferred. In this latter embodiment, routemen physically visit the location of each computer jukebox **13**. During these visits, the routemen carry a portable management system **181** which has only a subset of potential replacement songs stored in a subset library and associated catalog (not shown) on a portable bulk storage unit **183**. The subset library is loaded by the portable management system **181** onto the portable bulk storage unit **183** either directly from the bulk storage unit **25** or indirectly as is initially done by the central management system **11** (described above). In all other ways, the portable management system **181** operates the same as the central management system **11**, collecting the catalog **95** of each jukebox **13** and updating or replacing as necessary. To accomplish this, the portable management system **181** communicates at a very high rate of speed with the jukebox **13** via a parallel communication link **185** and a direct memory access (DMA) link **187**.

Additionally, the routemen may simply exchange the "old" storage unit **93** with a pre-loaded storage unit (not shown). The central management system **11** may later read the "old" storage unit **93** to gather the information from the catalog **95**. Such an embodiment still enjoys the other advantages made possible by the computer jukeboxes **13** described herein.

Additionally, the visual display **125** can be directed to display various advertisements. The advertisements are downloaded from the central management system **11** to selected computer jukeboxes **13** via the transmission link **15**. Also downloaded with the advertisements is digital data representing the identity of each advertisement, the number of times, and when each of the advertisements is to be run. The advertisement data is stored at a separate location on the storage unit **93** so that they can be easily located and tracked.

The advertisements like the audio data are preferably sent to the computer jukebox **13** in compressed form, using a known compression scheme. The compressed data is preferably sent in packets that contain a header. The header contains information about the advertisement including how many times a day the advertisement should be run and at what times. The advertisements can then be displayed at the predetermined times on the visual display **125**.

In the preferred embodiment, if a conflict arises between a song being played and the time for an advertisement to be played, the conflict is resolved as follows. If the song contains audio only and no associated graphics being shown on the visual display **125**, then the advertisement, if it is video only, will be played simultaneously. If the advertisement contains video data and audio data, the advertisement will be run at the next available time slot or be shipped altogether. As each jukebox **13** tracks when an advertisement starts and when it stops, if a particular advertisement is never run, then the central management system will receive such information and the advertiser will be billed accordingly.

The advertisements are also stored in the storage unit **93**. Because there is bilateral communication between the central management system **11** and the computer jukeboxes **13**, the central management system **11** can track the number of times each advertisement is actually run for billing and royalty purposes by having this information uploaded from the computer jukebox **13** to the central management system **11**. The transmission link **15** that's used to download or transmit these advertisements can be any of the means disclosed above, including, modems **17**, **19**, a cable system, a RF link, a satellite link, a cellular telephone link, or a portable handheld device.

The downloading and storing of advertisements is completed by the same apparatus and method as described above in connection with FIGS. **1** through **5**.

In yet another embodiment, the computer jukebox **13** is associated with an electronic game, such as an electronic dart game. In the embodiment, the advertisements are also played on the visual display **125** associated with the electronic game when the game is not being played.

Additionally, it is to be understood that the embodiments of the present invention described hereinabove are merely illustrative and that other modifications and adaptations may be made without departing from the scope of the appended claims.

We claim:

1. A computer jukebox capable of receiving and storing digital data representing a plurality of advertisements, data representing the identity of each of said advertisements, and data representing when and the number of times each of said advertisements is to be run, comprising:

a visual screen associated with said jukebox;

a song selection means displayed on said visual screen, actuable by a user for retrieving and playing a signal representing a song selected from a plurality of songs stored in said jukebox;

a communication interface for receiving said advertisement data, said data representing the identity of each of said advertisements, and said data representing when and the number of times each of said advertisements is to be run;

a programmable computer memory storing said digital data representing each advertisement on said jukebox, the location of said digital data representing each advertisement, and said data representing when and the number of times each of said advertisements is to be run on said visual screen; and

processing means for displaying one of said plurality of advertisements on said visual screen, when said jukebox is not generating a signal representing a song selected from said plurality of songs stored in said jukebox, wherein said processing means is responsive to said data representing when and the number of times each of said advertisements is to be run.

2. A computer jukebox as recited in claim **1** wherein said communication interface includes a modem.

3. A computer jukebox as recited in claim **1** wherein said communication interface includes a radio frequency receiver.

4. A computer jukebox as recited in claim **1** wherein said communication interface includes a direct interface port.

5. A computer jukebox as recited in claim **1** wherein said communication interface includes portable infra red device.

6. A computer jukebox as recited in claim **1** wherein said communication interface includes a satellite receiver.

7. A computer jukebox as recited in claim **1** wherein said communication interface includes a cellular telephone receiver.

8. A jukebox network comprising: a plurality of computer jukeboxes, each jukebox including a programmable computer memory storing digital data representing a plurality of advertisements and data representing the identity of each of said advertisements, and data representing when and the number of times each of said advertisements is to be run;

a visual display;

a communication interface for receiving and transmitting digital data including digital advertisement data;

processing means for controlling the display of advertisement data on said visual display and to store advertisement display data in said memory, said processing means being responsive to the receipt of digital advertisement data representative of the number of times each of said advertisements is to be run and when each advertisement is to be run by said communication interface;

a management station for updating said plurality of jukeboxes, said management station including a communication interface for receiving and transmitting data and a host processing means for controlling the transmission of digital advertisement data to a computer jukebox to update the jukebox, said management station being operative for selectively transmitting digital advertisement data to different ones of said jukeboxes.

9. A jukebox network as recited in claim **8** wherein said management station is remote from said plurality of jukeboxes and the communication interface of said management station and each jukebox provides a two way communication link between said remote management station and said jukebox.

10. A jukebox network as recited in claim **8** wherein said management station is portable.

11. A jukebox network as recited in claim **10** wherein said communication interface of said management station provides a direct communication between said station and said jukebox.

* * * * *

EXHIBIT D

US006397189B1

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

(10) **Patent No.: US 6,397,189 B1**
(45) **Date of Patent: *May 28, 2002**

(54) **COMPUTER JUKEBOX AND JUKEBOX NETWORK**

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(73) Assignee: **Arachnid, Inc.**, Rockford, IL (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **09/076,849**

(22) Filed: **May 12, 1998**

Related U.S. Application Data

(63) Continuation of application No. 08/584,253, filed on Jan. 11, 1996, now Pat. No. 5,781,889, which is a continuation of application No. 08/268,782, filed on Jun. 30, 1994, now abandoned, which is a division of application No. 07/846,707, filed on Mar. 6, 1992, now Pat. No. 5,355,302, which is a continuation-in-part of application No. 07/538,981, filed on Jun. 15, 1990, now abandoned.

(51) **Int. Cl.**[7] **G06F 17/60**

(52) **U.S. Cl.** **705/1**; 705/50; 705/51; 705/26

(58) **Field of Search** 705/1, 16, 28, 705/50, 51, 52, 10, 21, 22

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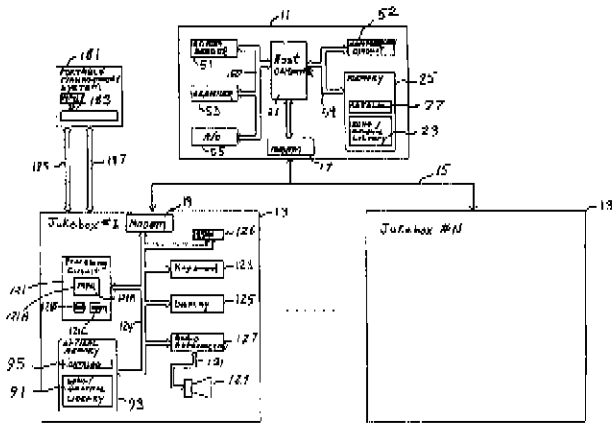
Primary Examiner—James P. Trammell
Assistant Examiner—Calvin L. Hewitt, II
(74) *Attorney, Agent, or Firm*—McAndrews, Held & Malloy, Ltd.

(57) **ABSTRACT**

A central management system manages a plurality of computer jukeboxes and communicates compressed digital data with each jukebox via a transmission link. The management system also includes a host computer that maintains a master set of compressed digital data representing a plurality of songs, song associated graphics, and song identity information. Each jukebox includes a storage unit that is capable of storing a subset of the master set and a processing circuit having a decompression circuit. The processing circuit controls the operation and flow of digital data into and out of the jukebox through the transmission link as well as a visual song information display, user song selection keys, a money detector, and an audio reproduction circuit coupled to a speaker system so as to provide audio output to users of the jukebox.

11 Claims, 5 Drawing Sheets



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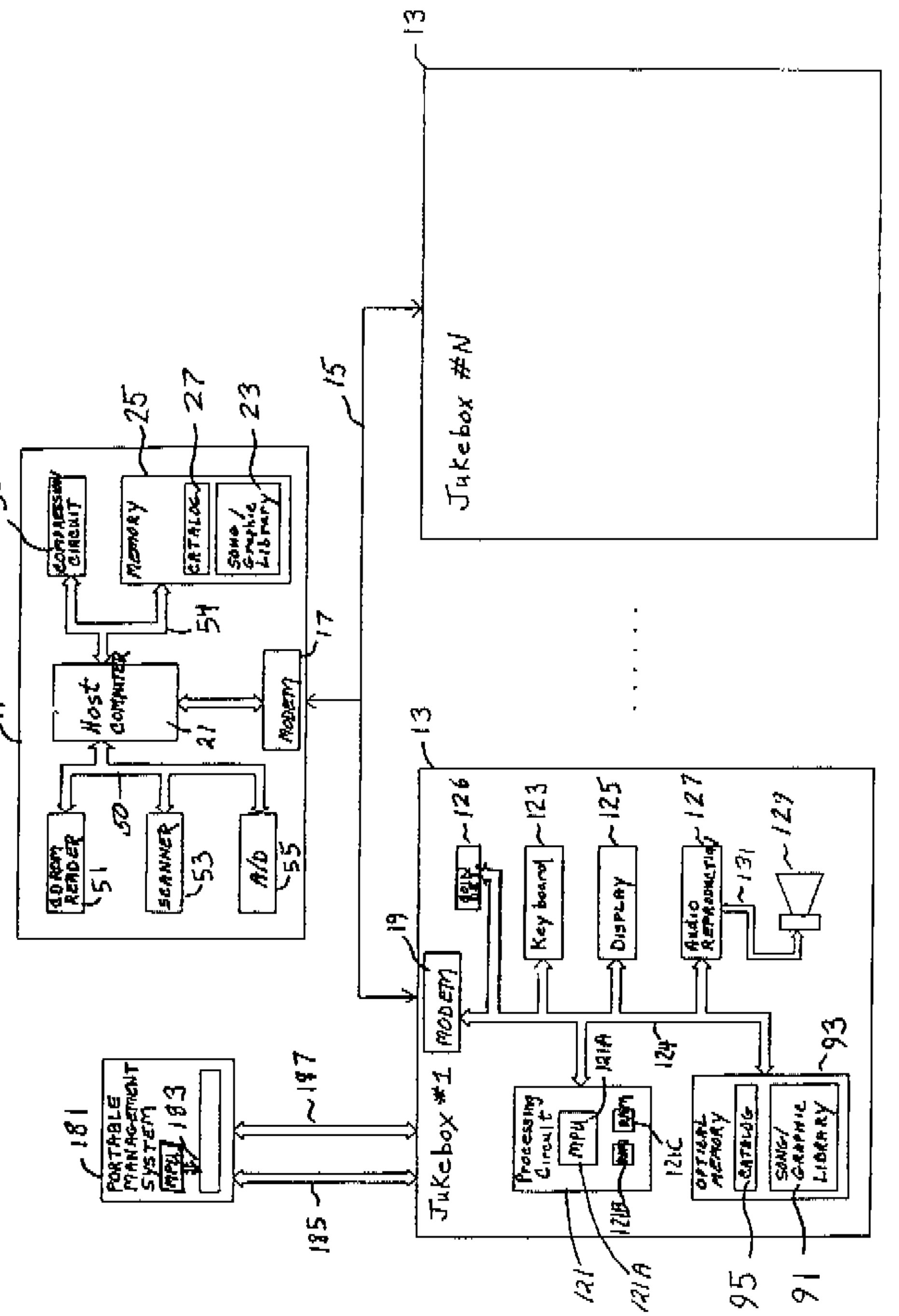

Host Computer
Memory
Catalog
Song / Graphic Library
Compression Circuit
CD ROM Reader
Scanner
A/D
Modem
Jukebox #N
Jukebox #1
Modem
Keyboard
Display
Audio Reproduction
Processing Circuit
MPU
Optical Memory
Catalog
Song/ Graphic Library
Portable Management System
MPU

FIG. 1

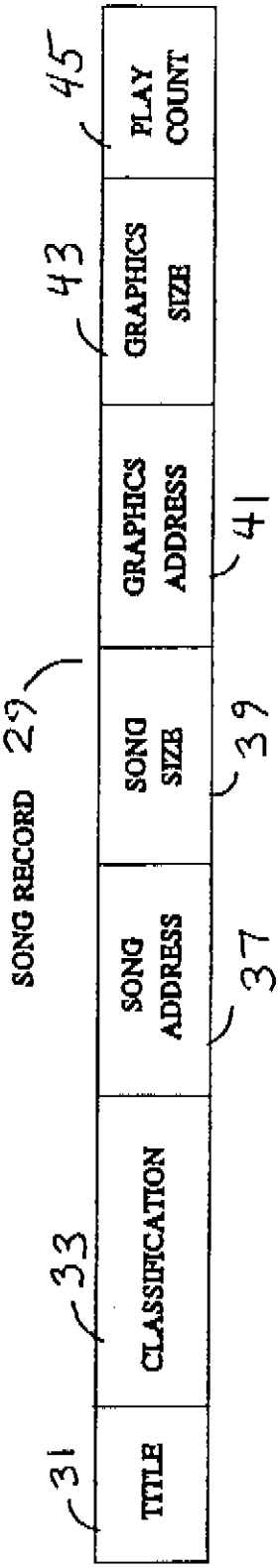

SONG RECORD
29
TITLE
31
CLASSIFICATION
33
SONG ADDRESS
37
SONG SIZE
39
GRAPHICS ADDRESS
41
GRAPHICS SIZE
43
PLAY COUNT
45

FIG. 2

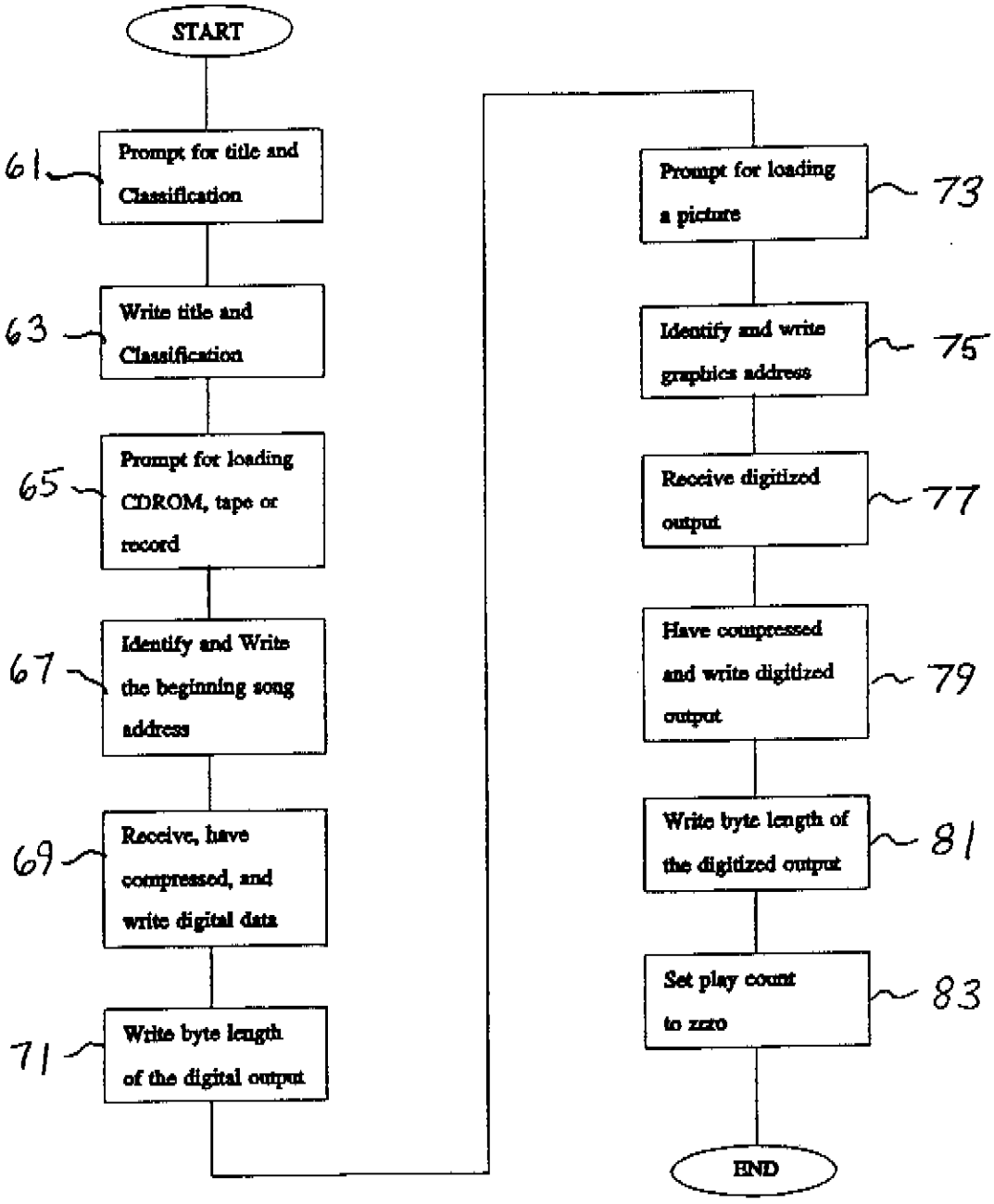

START
61
Prompt for title and Classification
63
Write title and Classification
65
Prompt for loading CDROM, tape or record
67
Identify and Write the beginning song address
69
Receive, have compressed, and write digital data
71
Write byte length of the digital output
73
Prompt for loading a picture
75
Identify and write graphics address
77
Receive digitized output
79
Have compressed and write digitized output
81
Write byte length of the digitized output
83
Set play count to zero
END

FIG. 3

FIG 4A

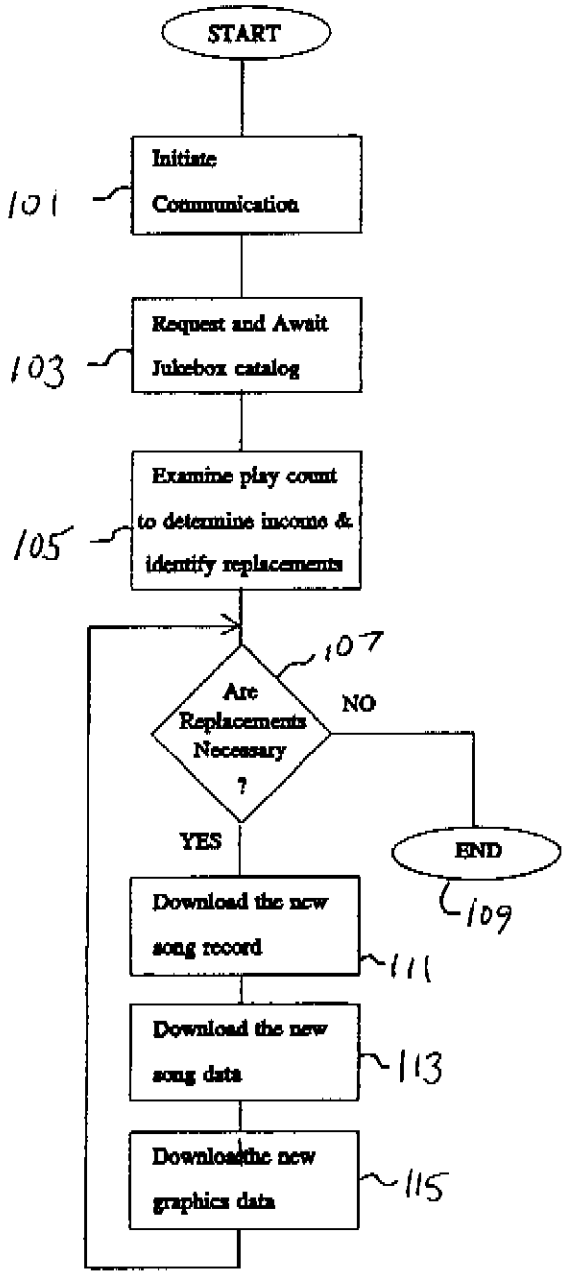
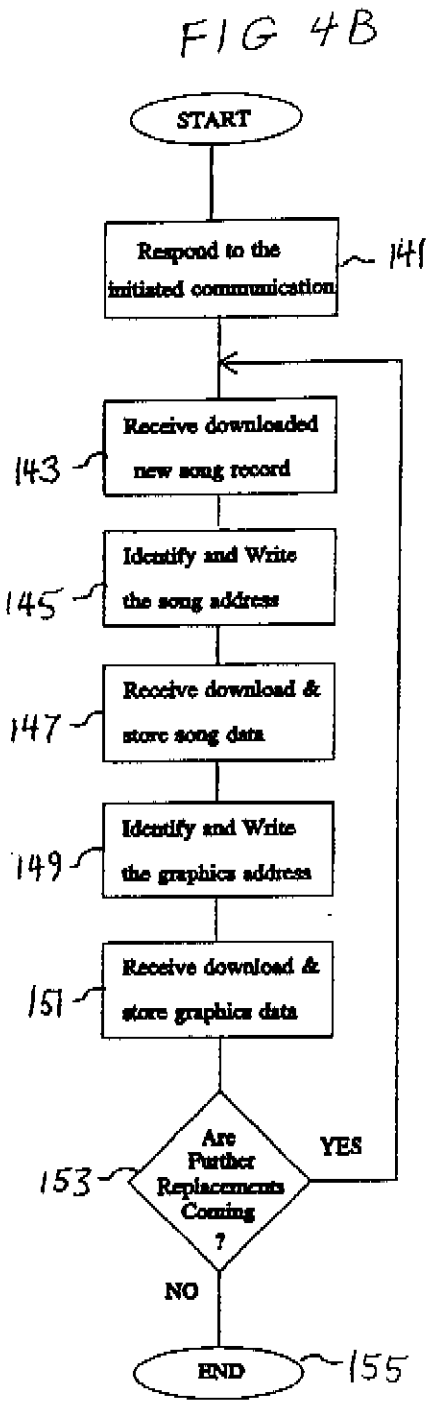

START
Initiate Communication
101
Request and Await Jukebox catalog
103
Examine play count to determine income & identify replacements
105
Are Replacements Necessary ?
107
NO
YES
END
109
Download the new song record
111
Download the new song data
113
Download the new graphics data
115

FIG 4B


START
Respond to the initiated communication
141
Receive downloaded new song record
143
Identify and Write the song address
145
Receive download & store song data
147
Identify and Write the graphics address
149
Receive download & store graphics data
151
Are Further Replacements Coming ?
153
YES
NO
END
155

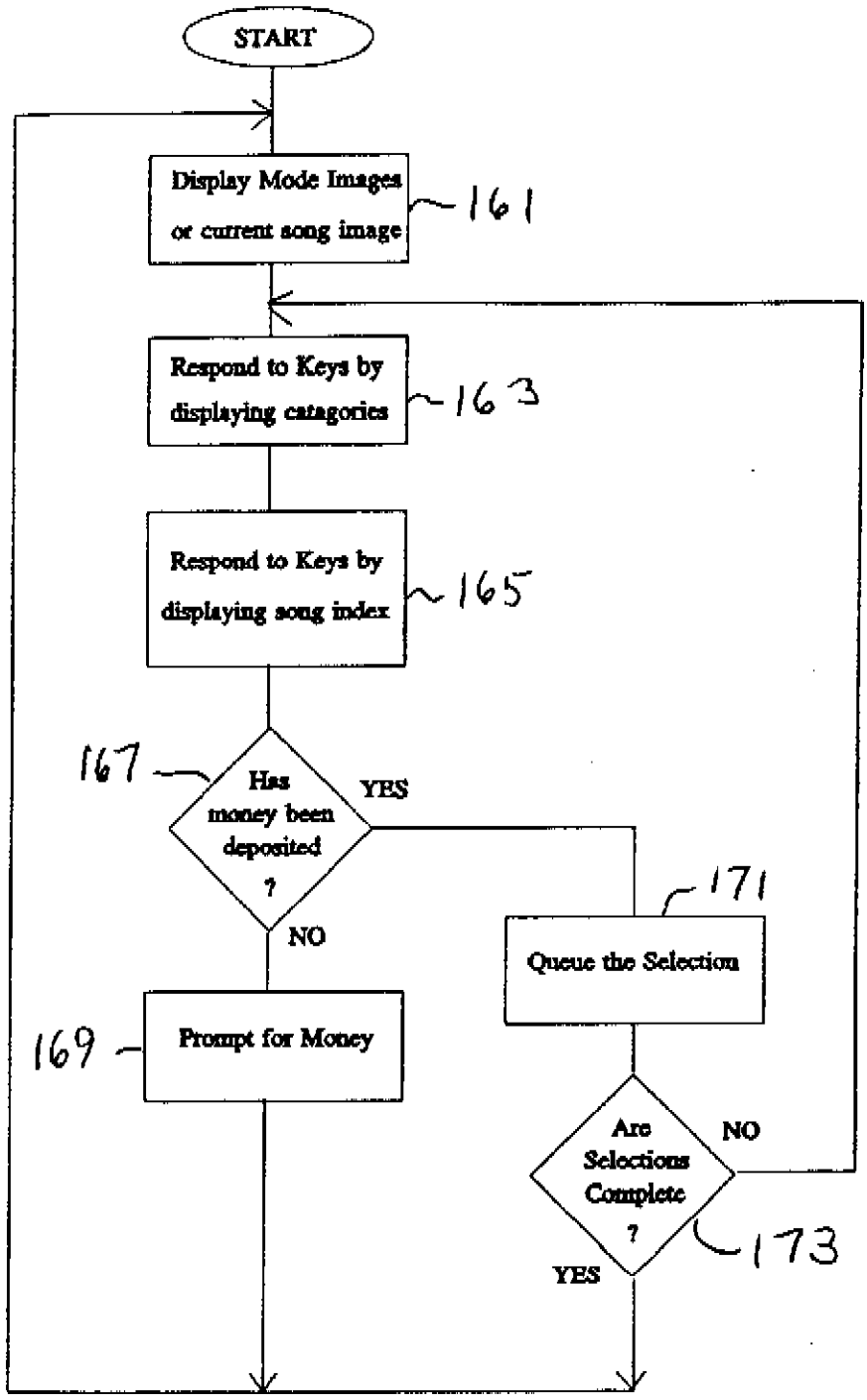

START
Display Mode Images or current song image
161
Respond to Keys by displaying catagories
163
Respond to Keys by displaying song index
165
167
Has money been deposited ?
YES
NO
171
Queue the Selection
169
Prompt for Money
Are Selections Complete ?
NO
YES
173

FIG. 5

COMPUTER JUKEBOX AND JUKEBOX NETWORK

This application is a continuation of U.S. patent application Ser. No. 08/584,253 filed Jan. 11, 1996, allowed Dec. 24, 1997, now U.S. Pat. No. 5,781,889, which is a continuation of U.S. patent application Ser. No. 08/268,782 filed Jun. 30, 1994, now abandoned, which is a division of U.S. patent application Ser. No. 07/846,707, filed Mar. 6, 1992, now U.S. Pat. No. 5,355,302, which is a continuation-in-part of U.S. application Ser. No. 07/538,981, filed Jun. 15, 1990, now abandoned.

FIELD OF THE INVENTION

The present invention relates generally to a jukebox system, and more particularly to such a system including one or more computer jukeboxes that can be managed from a remote location.

BACKGROUND OF THE INVENTION

Heretofore, an assortment of musical recordings found in a jukebox consists of a plurality of records, each record containing a specific recording. Traditionally, these records are grooved phonograph records. After a patron makes a selection, the selected phonograph record is mechanically removed from a storage rack within the jukebox, and the phonograph record is placed upon rotating platform. A stylus which is connected to a speaker system is then placed upon the rotating phonograph record, resulting in the phonograph record being played by the jukebox. For each selection, a separate phonograph record must be removed from the storage rack in order to be played by the jukebox.

Conventional jukeboxes have also implemented compact disks as means for creating an assortment of musical songs. Compact disks provide the improved sound quality made possible by digital recordings. The same technique, however, is used to play compact disks. A separate compact disk corresponding to each selection must be removed from a storage rack in order for the jukebox to play the selection.

Updating conventional jukeboxes is a costly and time consuming task. Routemen must periodically travel to each jukebox location and replace the existing recordings of each jukebox with up-to-date records. The existing recordings are no longer used by the jukebox once removed, thus making the conventional method wasteful.

Routemen must also travel to each jukebox location to keep a tally of the number of times each musical recording is selected in order to determine royalty fees. It is known to provide a jukebox with a counter that keeps track of the number of times each musical recording is selected, but routemen must still travel to each jukebox location to obtain this information. Such a process requires an excessive number of people to visit jukebox location periodically and visually read the information off the counter within each jukebox. Since the number of jukeboxes in operation is quite large, the employment of routemen to obtain such data involves a considerable expense. Furthermore, the ever changing nature of the recording industry requires that such data be gathered frequently in order to keep abreast of a continually changing market.

OBJECTS AND SUMMARY OF THE INVENTION

Accordingly, it is a primary object of the present invention to provide a method and apparatus for managing a plurality of computer jukeboxes which is capable of eliminating the necessity for routemen to change records in the jukeboxes. The computer jukeboxes store recordings in memory, thus enabling routemen to simply load new recordings into the memory of each computer jukebox.

Another object of the present invention is to eliminate a necessity for routemen by enabling new recordings and selection menus to be downloaded to each computer jukebox via a transmission link. In that regard, it is an object of the present invention to provide a method and apparatus which eliminates the material waste usually associated with updating jukeboxes. Instead of throwing away old recordings and replacing them with new ones, as is the conventional procedure, the present invention eliminates this waste by enabling new recordings to simply be downloaded into the memory of each computer jukebox. The old recordings are simply erased, if necessary.

Another object of the present invention is to provide a method and apparatus which is capable of remotely obtaining jukebox usage data, thus eliminating a necessity for routemen to do this task. The present invention utilizes a computer jukebox, which as part of its software programming, stores the number of times each musical recording is played and the number of credits that have been awarded. This data is uploaded to a central control device via a transmission link.

An additional object of the present invention is to provide a method and apparatus utilizing modern computer technology to digitally store and play musical records. The jukebox of the present invention is basically a computer having a sophisticated audio production capability, the computer storing digitized song data in a computer memory. Because conventional jukeboxes maintain compact discs or records in the jukebox, theft of the compact disc/records has been a problem, this problem being eliminated by the present invention's utilization of a computer memory to store the digitized song data.

A further object of the present invention is to provide a method and apparatus capable of being used with the remote management of jukeboxes via public telephone lines without interfering with establishments' use of their own phone lines.

Other objects, features and advantages of the present invention will be readily apparent from the following description of certain preferred embodiments thereof taken in conjunction with the accompanying drawings, although variations and modifications may be effected without departing from the spirit and scope of the novel concepts of the disclosure.

BRIEF DESCRIPTION OF THE DRAWING

FIG. **1** is a block diagram of the computer jukebox system of the present invention;

FIG. **2** is an illustration of the data structure of an individual song record stored in a master library catalog illustrated in FIG. **1**;

FIG. **3** is a flow-chart illustrating the procedure for storing new songs in a bulk storage unit illustrated in FIG. **1**;

FIGS. **4**A and B are flow-charts illustrating the software procedures used by the central management system and the jukebox respectively in managing the song library of the jukebox; and

FIG. **5** is a flow-chart illustrating the specific operation of the jukebox in interfacing with a user.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

In accordance with the present invention as shown in FIG. **1**, a central management system **11** monitors and updates the

available selection of music at a number of remotely located jukeboxes such as a jukebox **13**. Particularly, the central management system **11** monitors each jukebox **13** to determine the number of times each song has been played. From these numbers, the central management system **11** can calculate the royalty payments that are due. More importantly, the central management system **11** can identify those specific songs which need to be replaced in each jukebox on an individual basis, the central management system communicating replacement songs to each jukebox **13** to update the available music selection therein as needed.

Each jukebox **13** is basically a computer having sophisticated audio production capability wherein each computer jukebox **13** is programmed to play songs that have been digitally compressed and stored in a large-volume data storage unit **93**. The storage unit **93** may be a optical memory or any other available large volume nonvolatile computer memory that provides both read and write access.

The central management system **11** communicates with each computer jukebox **13** via a transmission link **15**. The central management system **11** and each jukebox **13** use respective modems **17** and **19** to maintain serial communication on the transmission link **15**. The transmission link **15** may be a cable system such as public or private telephone lines or the like. However, the modems **17** and **19** may be replaced with RF (radio frequency) transceivers and associated antennas. In the latter instance the transmission link **15** is an RF link.

Specifically, the central management system **11** includes a host computer **21** which maintains a master library **23** of songs and associated graphics which are stored in a compressed digital form in a bulk storage unit **25**. The bulk storage unit **25** is capable of storing vast amounts of digital data, and may be take the form of a read-write optical storage device. The host computer **21** indexes the master library **23** by using a master catalog **27** which is also maintained in the bulk storage unit **25**.

The master catalog **27** stores a song record **29**, as illustrated in FIG. **2**, for each song stored in the master library **23**. Each song record **29** associates information in the following fields: a) a title field **31**, containing the name of the song; b) a classification field **33**, containing the type of music, i.e., country, pop, jazz, classical etc.; c) a song address field **37**, containing the beginning address in the bulk storage unit **25** of the compressed digital data of the song; d) a song size field **39**, containing the number of bytes in length of the compressed digital data; e) a graphics address field **41**, containing the beginning address in the bulk storage unit **25** of the compressed digital data of a graphics image, if any, to be associated with the song; f) a graphics size field **43**, containing the number of bytes in length of the compressed graphics image; and g) a play count field **45**, containing a count which indicates the number of times this specific song has been played. By parsing the master catalog **27**, the host computer **21** can quickly locate all available information relating to any available song. The master catalog **27** also stores data particular to each jukebox such as the number of times each available song has been played, the coin intake for that jukebox, etc. The data particular to each jukebox is uploaded from the jukebox to the central management system **11** to update the master catalog **27**.

Returning to FIG. **1**, in order to add to the master library **23** and associated master catalog **27**, the host computer **21** receives, has compressed and stores in the bulk storage unit **25** digital data representing the new song and associated pictorial graphics. The host computer **21** receives the digital data for storage from three sources: 1) a compact disc read only memory (CDROM) reader **51**, which reads CDROMs; 2) a graphics scanner **53**, which digitizes pictorial graphic images; and 3) an analog to digital (A/D) reader/converter **55**, which reads analog data from both tapes and records and then converts the analog data into digital data. A compression circuit **52** using an adaptive-delta, pulse-code-modulation compression scheme compresses the digital data before it is stored. Other compression schemes may also be used. The compression circuit **52** might also be fully replaced by a software algorithm which is executed by the host computer **21**.

FIG. **3** more specifically illustrates the operation of the host computer **21** in adding new songs to the master library **23**. At a block **61**, the user is initially prompted by the host computer **21** to enter a new song title and category. The host computer **21** writes this information into the title field **31** and classification field **33** of a new song record **29** at a block **63**. Next, at a block **65**, the host computer **21** prompts the user to place either a CDROM into the reader **51** or a record or tape into the reader/converter **55**. After the user has completed this placement, at a block **67** the host computer **21** identifies available storage space in the bulk storage unit **25** by analyzing the space in use as described in the current list of song records **29** in the master catalog **23**. The beginning address of this available storage space is placed in the song address field **37** of the new song record **29**. Thereafter, at a block **69**, the host computer **21** provides a read enable signal on a bus **50** to either the reader **51** or reader/converter **55**. Either the reader **51** or reader/converter **55** responds by reading and sending digital data representing the now gong to the host computer **21** via the bus **50**. Utilizing a bus **54**, the host computer **21** forwards the digital data received to the compression circuit **52**, receives compressed digital data from the compression circuit **52** and writes the compressed digital data into the bulk storage unit **25**. At a block **71**, upon reaching the end of the digital data output, i.e., the end of a song, the host computer **21** writes the byte length of the digital output into the song size field **39**.

The host computer **21** at a block **73** prompts the user to load a picture, such as an album cover, into the graphics scanner **53**. At a block **75**, the host computer **21** identifies further available storage space in the bulk storage unit **25** and places the beginning address thereof into the graphics address field **41**. Once a picture is loaded, the host computer **21** at block **77**, using the bus **50**, provides a read enable signal to the scanner **53** which responds via bus **50** by digitizing the picture and transferring the digitized output to the host computer **21**. At a block **79**, using the bus **54**, the host computer **21** forwards the digitized data of the picture to the compression circuit **52**, receives compressed digitized data from the compression circuit **52**, and writes the compressed digitized data into the bulk storage unit **25**. At a block **81**, upon reaching the end of the digitized output, i.e., the end of the picture, the host computer **21** places the byte length of the digitized output into the graphics size field **43**. Finally, at a block **83**, the host computer **21** sets the play count field **45** to zero (0). This flow-chart is repeated as necessary until all of the new songs are added to the master library **27**. It is noted that the operator can also delete, modify or replace any specific song record **29** found in the master catalog **23** and master library **27**.

Returning to FIG. **1**, each computer jukebox **13** plays songs and displays graphics which are stored locally in the large-volume data storage unit **93**. The storage unit **93** of the jukebox **13** contains a subset of the songs found in the master library **27** maintained by the central management

system **11**. More specifically, the storage unit **93** of the jukebox **13** stores a song library **91** which is a corresponding subset of the master library **27**. The song library **91** contains all of the currently available song selections and associated pictorial graphics for the jukebox **13**. The storage unit **93** also stores a catalog **95** that is an index into the local song library **91**. The catalog **95** is similar to the master catalog **23**. Both the song library **91** and associated catalog **95** are monitored and updated by the central management system **11** as needed via the transmission link **15**. The jukebox **13** permits this monitoring and updating at any time with no impact on its end-user performance.

The jukebox **13** also includes a processing circuit **121** which contains a microprocessor **121A**, read only memory (ROM) **121B** and random access memory (RAM) **121C**. As in conventional computer systems, the microprocessor **121A** operates in accordance with the software program contained in the ROM **121B** and utilizes the RAM **121C** for scratch-pad memory. The processing circuit **121** may also contain a decompression circuit (not shown) or may perform decompression using a software algorithm stored in the ROM **121B** depending on the type of data compression scheme used by the central management system **11**. In either case, decompression is necessary to decompress the compressed data received from the central control system **11** so that the song can be played and associated graphics image displayed.

The processing circuit **121** controls the operation and flow of data into and out of the jukebox **13** through the modem **19** via a bus **124**. Using the bus **124**, the processing circuit **121** also controls a visual display **125**, one or more selection keys **123** and a coin/bill detector **126** to provide the user with an interactive interface to the jukebox **13**. The keys **123** provide signals representing user inputs such as displayed song selection. The display **125** displays alpha numeric information as well as pictorial graphics to interface with the user. The coin/bill detector **126** is responsive to one or more coins or bills input by a customer to determine whether the proper amount of money has been input and to provide money detect signals coupled to the processing circuit. The processing circuit **121** further controls, via the bus **124**, an audio reproduction circuit **127** coupled to a speaker system **129** along a bus **131** to provide an audio output to the user.

FIGS. **4A** and **4B** are flow-charts illustrating the software procedures respectively used by the central management system **11** and the jukebox **13** in managing the song library **91** of the jukebox **13**. At a block **101**, the central management system **11** initiates communication with one of the jukeboxes **13** via the transmission link **15**. Immediately thereafter, at a block **103**, the management system **11** requests that the jukebox data be sent including a copy of the catalog **95**. At a corresponding block **141**, the jukebox **13** responds by sending the copy of the catalog file as well as other jukebox data including total money intake over a period of time. The data sent from the jukebox to the management station may also include customer requests for new songs, a customer utilizing the display and keyboard of the jukebox **13** to enter song request data as discussed below. Thereafter, at a block **105**, by examining each play count field **45** in the copy of the catalog **95** received, the management system **11** determines the royalty amount due per song and whether to replace or update specific song entries stored in the jukebox **13**. The management system **11** also determines the total money intake from the play count information and compares this value to the total money intake value received from the jukebox to provide a check. At an inquiry block **107**, if no replacements are necessary, the management system **11** branches to a block **109** to terminate communication with the jukebox **12**. If, however, replacements are necessary, the management system **11** branches to download the changes. Particularly, at a block **111**, the management system **11** downloads to the jukebox **13** the song records **29** of both the song to be replaced and the replacement song. In a corresponding block **143**, the jukebox **13** replaces the song record **29** in the catalog **95**. Thereafter, the jukebox **13** identifies available storage space in the storage unit **93** based on the song size field **39** of the new song, and writes the beginning address thereof into the song address field **37** in a corresponding block **145**. Afterwards, at a block **113**, the central management system **11** downloads the compressed digital data of the song to the jukebox **13**. At a corresponding block **147**, the jukebox **13** receives and writes the data into the song library **91**. Next, at a corresponding block **149**, the jukebox **13** identifies available storage spade in the storage unit **93** based on the graphics size field **43**, and writes the beginning address thereof into the graphics address field **41** of the new song. Thereafter, at a block **115**, the management system **11** downloads the compressed digitized data of the picture to the jukebox **13**. The jukebox, at a corresponding block **151**, receives and writes the data into the song library **91**. Finally, the block **107** is again encountered. If further replacements need to be made, the blocks **111**, **113** and **115** are repeated until complete. At a corresponding block **153**, the jukebox similarly repeats the corresponding blocks **143** through **151** until no further replacements need to be made. A further block placed immediately above the block **107** may also be used, wherein the central management system **11** sends a delete, modify, add or replace command to the jukebox **13** before downloading into the song library **93**. In this way, the management system **11** receives additional flexibility in updating the jukebox **13**. It is noted that the jukebox **13** can also initiate communications with the management system **11** at predetermined times or if the jukebox determines that an event has occurred that the management system **11** should be aware of.

FIG. **5** is a flow-chart illustrating the specific operation of the processing circuit **121** of the jukebox **13** in interfacing with the user. At a block **161**, if no song selection is playing, the processing circuit **121** operates in a user attract mode, displaying a random sequence of available graphic images on the visual display **125**. More particularly, the processing circuit **121** randomly selects a starting address of the compressed graphics data from the available song records **29** in the catalog **95**. From that starting address, the circuit **121** retrieves the data from the song library **91** via the bus **124**. The circuit **121** decompresses and transfers the data along the bus **124** to the visual display **125** for display. Thereafter, the circuit **121** again randomly selects a starting address of available graphics data and this cycle repeats. If, however, a song selection is being played when the block **161** is encountered, the attract mode sequencing does not occur. Instead, the circuit **121** displays the associated graphics image of the song being played on the display **125**. During the attract mode the processing circuit **121** may also control the display **125** to present a prompt requesting customers to enter new song requests. The new song request data entered by a customer using the keyboard is stored and uploaded to the management system **11** to aid the system **11** in determining whether new song data should be downloaded to the jukebox.

At a block **163**, the processing circuit **121** responds to a signal indicating user interest from the selection keys **123** by providing on the display **125** those music categories, i.e., country, rock, jazz, etc., found in the catalog **95**. At a block

165, the circuit 121 responds to a signal indicating a category selection from the keys 123 by providing on the display 125 an index of available songs, arranged alphabetically either by artist or title, which can be scrolled and selected using the keys 123. Upon selection of a specific song, the circuit 121 encounters an inquiry block 167. If at the block 167 the circuit 121 determines from the signal received from the money detector 125 that a sufficient amount of money has not been deposited, a branch to a block 169 occurs. At the block 169, using the display 125, the circuit 121 prompts the user to deposit money into the coin/bill detector 126, then branches back to the block 161. However, if sufficient moneys have been deposited, the circuit 121 branches to a block 171 wherein the circuit 121 updates the play count field of the selected song's record in the catalog file 95 and money intake data stored in the memory. The circuit also places the song record 29 corresponding to the selected song into a queue of song records to be played. After the selection is queued, the circuit 121 encounters an inquiry block 153. If the total number of selections purchased have been selected, the circuit 121 branches back to the block 161. Otherwise, if further purchased selections are forthcoming, the circuit 121 branches back to the block 163. In this manner, all of the selections are made and placed in the queue. Upon completion of playing a queued-up, selected song, the circuit 121 removes the corresponding song record 29 from the queue, selects the next song record in the queue, begins to play that next song, and executes the block 161. It is noted that the song queue can be displayed on the display 125 in order to show customers what songs have already been selected prior to making their selection.

More specifically, referring back to FIG. 1, once a specific song has been selected and queued-up, the processing circuit 121 first identifies the beginning address of the compressed digital data from the song address field 37 of the song record 29 in the queue. From this address, using the bus 124, the circuit 121 reads the compressed digital data out of the storage unit 93, decompresses that data, and sends the decompressed digital data to the audio reproduction circuit 127. The audio reproduction circuit 127, commonly found in CDROM readers and associated amplifiers, converts the digital data to an analog signal which is amplified and used to drive the speaker system 129 via the bus 131. After a selected song finishes playing, the processing circuit 121 deletes the song record 29 of the selected song from the queue, increments the play count field 45 associated with that song in the catalog 95, and begins playing the next selected song in the queue if any exists. The process set forth in the flow-chart detailed in FIG. 5 is then repeated.

While the present invention is being described and illustrated in accordance with the preferred embodiment enabling new recordings and computer usage data to be transferred via the transmission line 15, the monitoring and updating may also be directly transferred. In this latter embodiment, routemen physically visit the location of each computer jukebox 13. During these visits, the routemen carry a portable management system 181 which has only a subset of potential replacement songs stored in a subset library and associated catalog (not shown) on a portable bulk storage unit 183. The subset library is loaded by the portable management system 181 onto the portable bulk storage unit 183 either directly from the bulk storage unit 25 or indirectly as is initially done by the central management system 11 (described above). In all other ways, the portable management system 181 operates the same as the central management system 11, collecting the catalog 95 of each jukebox 13 and updating or replacing as necessary. To accomplish this, the portable management system 181 communicates at a very high rate of speed with the jukebox 13 via a parallel communication link 185 and a direct memory access (DMA) link 187.

Additionally, the routemen may simply exchange the "old" storage unit 93 with a pre-loaded storage unit (not shown). The central management system 11 may later read the "old" storage unit 93 to gather the information from the catalog 95. Such an embodiment still enjoys the other advantages made possible by the computer jukeboxes 13 described herein.

Additionally, it is to be understood that the embodiments of the present invention described hereinabove are merely illustrative and that other modifications and adaptations may be made without departing from the scope of the appended claims.

What is claimed is:

1. An improved computer jukebox for playing songs selected by users of the computer jukebox from a library of songs that have been digitally compressed and stored in the computer jukebox, where the library of songs stored in the computer jukebox is capable of being updated upon the receipt of compressed digital song data, which represents at least one song, and upon the receipt of song identity data, which represents the identity of each such song, the computer jukebox comprising:

a communication interface for receiving the compressed digital song data and the song identity data;

a data storage unit for storing the received compressed digital song data and the received song identity data for each of the songs stored;

a display for showing, to prospective user of the computer jukebox, information identifying the songs for which digital song data is stored in the data storage unit and that is based on song identity data;

selection keys responsive to a selection of a song to be played on the computer jukebox from the song identity information displayed on the display, the selection keys including a signal output representing activation of the selection keys;

at least one audio speaker;

a processor connected to a memory, the memory including a decompression algorithm for decompressing compressed digital song data;

a digital to analog converter coupled between the processor and the audio speaker to convert digital song data to an analog signal coupled to the speaker; and

wherein the memory further includes instructions for:

causing the processor, in response to the signal output, to access and process compressed digital song data retrieved from the data storage unit so that the accessed compressed digital song data corresponds to the song selected by the selection keys;

causing the processor to decompress the accessed compressed digital song data and send the decompressed digital song data to the digital to analog converter so that the song selected is played on the computer jukebox as a result of the corresponding stored compressed song digital data being decompressed and converted by the processor and the digital to analog converter; and

causing the processor to respond to compressed digital song data and to song identity data, which may be received by the communication interface of the com-

puter jukebox, to control the storage of the received compressed digital song data and the received song identity data in the data storage unit to create an updated library of songs stored in the computer jukebox.

2. The computer jukebox of claim 1, wherein the memory further comprises instructions causing the processor to respond to control the information shown on the display to include the updated library of songs, instructions causing the processor to store song usage data generated upon the playing of a song, and wherein the communications interface includes a transmitter for transmitting song the song usage data under the control of the processor.

3. The computer jukebox of claim 1, wherein the data storage unit stores compressed pictorial graphics, received by the communication interface, and associated with the compressed digital song data.

4. The computer jukebox of claim 3, wherein the compressed pictorial graphics represent song associated pictorial graphics; and wherein the memory further comprises instructions causing the processor, when no song is playing on the computer jukebox, to generate a user attract mode wherein song associated graphic images are shown on the display.

5. The computer jukebox of claim 1, wherein the communication interface is selected from the group consisting essentially of: modems, radio frequency transmitters and receivers, and direct communication interface ports, and wherein the data storage unit stores compressed song identity data as received by the communication interface.

6. The computer jukebox of claim 1, wherein the display is at least 14 inches in diagonal measure.

7. An improved computer jukebox network comprising: a plurality of computer jukeboxes where each computer jukebox is capable of playing songs selected by users of the computer jukebox from a library of songs that have been digitally compressed and stored in the computer jukebox and where the library of songs is capable of being updated upon the receipt of compressed digital song data, which represents at least one song, and upon the receipt of song identity data which represents the identity of each such song; and a management station for updating the library of songs in each of the plurality of computer jukeboxes;

with each computer jukebox comprising:

a communication interface for receiving the compressed digital song data and the song identity data;

a data storage unit for storing the received compressed digital song data and the received song identity data for each of the songs stored;

a display for showing, to prospective user of the computer jukebox, information based on song identity data for identifying the songs for which digital song data is stored in the data storage unit;

selection keys responsive to a selection of a song to be played on the computer jukebox from the song identity information displayed on the display, the selection keys including a signal output representing activation of the selection keys;

at least one audio speaker;

a processor connected to a memory, the memory including a decompression algorithm for decompressing compressed digital song data;

a digital to analog converter coupled between the processor and the audio speaker to convert digital song data to an analog signal coupled to the speaker; and

wherein the memory further includes instructions for:

causing the processor, in response to the signal output, to access and process compressed digital song data retrieved from the data storage unit so that the accessed compressed digital song data corresponds to the song selected by the selection keys;

causing the processor to decompress the accessed compressed digital song data and send the decompressed digital song data to the digital to analog converter so that the song selected is played on the computer jukebox as a result of the corresponding stored compressed digital song data being decompressed and converted by the processor and the digital to analog converter; and

causing the processor to respond to compressed digital song data and to song identity data, which may be received by the communication interface of the computer jukebox, to control the storage of the received compressed digital song data and the received song identity data in the data storage unit to create an updated library of songs stored in the computer jukebox; and

wherein the management station comprises:

a communication interface including a receiver and a transmitter; and

a management station processor connected to a management station memory, the management station memory including instructions for:

causing the management station processor to store digital song data, representing a set of songs, and song identity data, representing the identity of each song in the set of songs in a management station data storage unit;

causing the management station processor to compress digital song data stored in the management station data storage unit;

causing the management station processor to compress and transmit a subset of the digital song data and transmit corresponding song identity data to at least one selected computer jukebox to update the library of songs in the computer jukebox.

8. The jukebox network of claim 7 wherein the management station is remote from the computer jukeboxes; and wherein the communication interface of each computer jukebox is a bi-directional communication interface.

9. The jukebox network of claim 7 wherein the management station is portable; and wherein the communications interface of the management station and at least one computer jukebox is a direct communication link interface.

10. The jukebox network of claim 7, wherein the memory in each computer jukebox further comprises instructions causing the processor to respond to control the information shown on the display to include the updated library of songs.

11. The jukebox network of claim 7, wherein the memory in each computer jukebox further comprises instructions causing the processor to store song usage data generated upon the playing of a song, and wherein the communications interface includes a transmitter for transmitting song the song usage data under the control of the processor.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 6,397,189 B1
DATED : May 28, 2002
INVENTOR(S) : John R. Martin, Michael L. Tillery and Samuel N. Zammuto

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

Column 4,
Line 31, delete "now gong" and substitute therefor -- new song --.

Column 6,
Line 17, delete "spade" and substitute therefor -- space --.

Column 8,
Lines 34-37, delete "a display for showing, to prospective user of the computer jukebox, information identifying the songs for which digital song data is stored in the data storage unit and that is based on song identify data;" and substitute therefor -- a display adapted for showing, to prospective user of the computer jukebox, user attract data and information that identifies the songs for which digital song data is stored in the data storage unit and that is based on song identity data; --
Line 52, after "wherein the memory further includes instructions for:" please insert -- causing the processor to have the display show at least one of user attract data and information that identifies the songs for which digital song data is stored in the data storage; --

Column 9,
Line 12, delete "transmitting song the song" and substitute therefor -- transmitting the song --.
Line 51, delete "a display for showing, to prospective user of the computer jukebox, information based on song identity for identifying the songs for which digital song data is stored in the data storage unit;" and substitute therefor -- a display adapted for showing, to prospective user of the computer jukebox, user attract data and information based on song identity data for identifying the songs for which digital song data is stored in the data storage unit; --

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

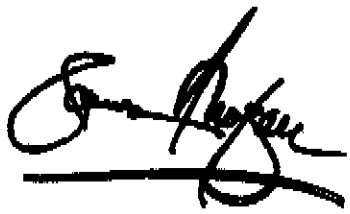
PATENT NO. : 6,397,189 B1
DATED : May 28, 2002
INVENTOR(S) : John R. Martin, Michael L. Tillery and Samuel N. Zammuto

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

Column 10,
Line 5, after "wherein the memory further includes instructions for:" please insert -- causing the processor to have the display show at least one of user attract data and information that identifies the songs for which digital song data is stored in the data storage; --

Signed and Sealed this

Twelfth Day of August, 2003



JAMES E. ROGAN
Director of the United States Patent and Trademark Office

EXHIBIT E

US006381575B1

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

(10) **Patent No.: US 6,381,575 B1**
(45) **Date of Patent: *Apr. 30, 2002**

(54) **COMPUTER JUKEBOX AND COMPUTER JUKEBOX MANAGEMENT SYSTEM**

(75) Inventors: **John R. Martin**; **Michael L. Tillery**, both of Rockford, IL (US)

(73) Assignee: **Arachnid, Inc.**, Rockford, IL (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **09/502,875**

(22) Filed: **Feb. 11, 2000**

Related U.S. Application Data

(63) Continuation of application No. 09/076,849, filed on May 12, 1998, which is a continuation of application No. 08/584,253, filed on Jan. 11, 1996, now Pat. No. 5,781,889, which is a continuation of application No. 08/268,782, filed on Jun. 30, 1994, now abandoned, which is a continuation of application No. 07/846,707, filed on Mar. 6, 1992, now Pat. No. 5,355,302.

(51) **Int. Cl.**[7] **G06F 17/60**

(52) **U.S. Cl.** **705/1**; 705/26; 705/50; 705/51

(58) **Field of Search** 705/50, 51, 52, 705/59, 10, 21, 22

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(57) **ABSTRACT**

A central management system manages a plurality of computer jukeboxes and communicates compressed digital data with each jukebox via a transmission link. The management system also includes a host computer that maintains a master set of compressed digital data representing a plurality of songs, song associated graphics, and song identity information. Each jukebox includes a storage unit that is capable of storing a subset of the master set and a processing circuit having a decompression circuit. The processing circuit controls the operation and flow of digital data into and out of the jukebox through the transmission link as well as a visual song information display, user song selection keys, a money detector, and an audio reproduction circuit coupled to a speaker system so as to provide audio output to users of the jukebox.

27 Claims, 5 Drawing Sheets

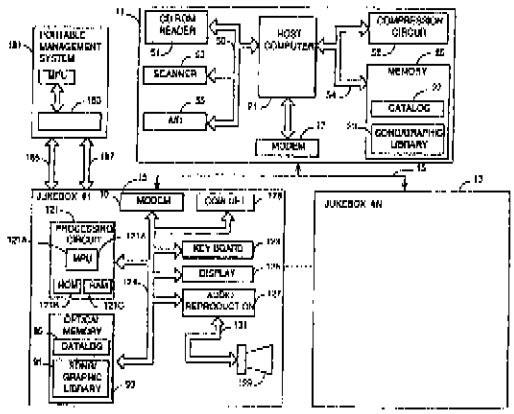

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FIG. 1

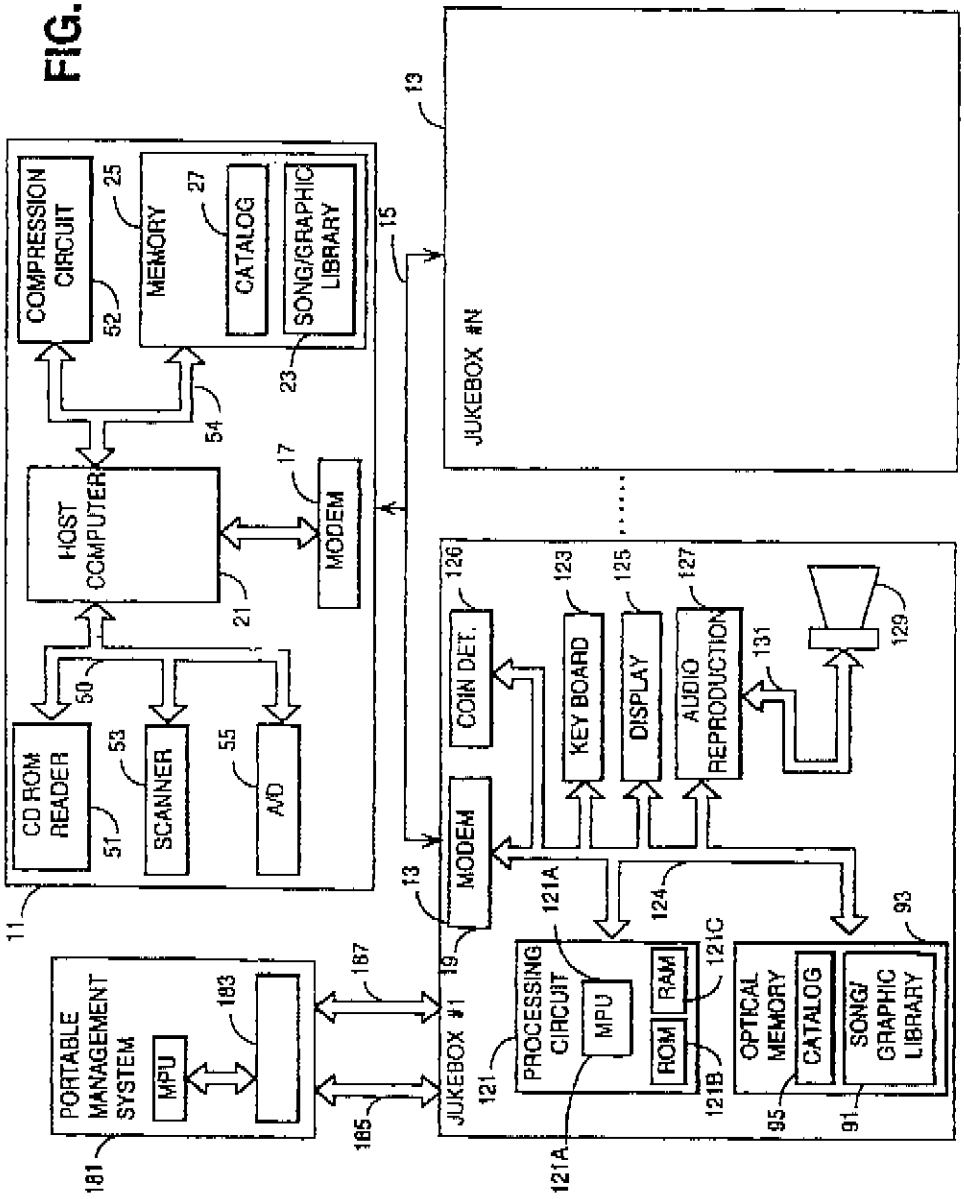

COMPRESSION CIRCUIT
MEMORY
CATALOG
SONG/GRAPHIC LIBRARY
HOST COMPUTER
MODEM
CD ROM READER
SCANNER
A/D
JUKEBOX #N
COIN DET.
KEY BOARD
DISPLAY
AUDIO REPRODUCTION
PROCESSING CIRCUIT
MPU
ROM
RAM
OPTICAL MEMORY
CATALOG
SONG/ GRAPHIC LIBRARY
PORTABLE MANAGEMENT SYSTEM
MPU
JUKEBOX #1
11
13
15
17
19
21
23
25
27
50
51
52
53
54
55
91
93
95
121
121A
121B
121C
123
124
125
126
127
129
131
181
183
185
187

FIG. 2

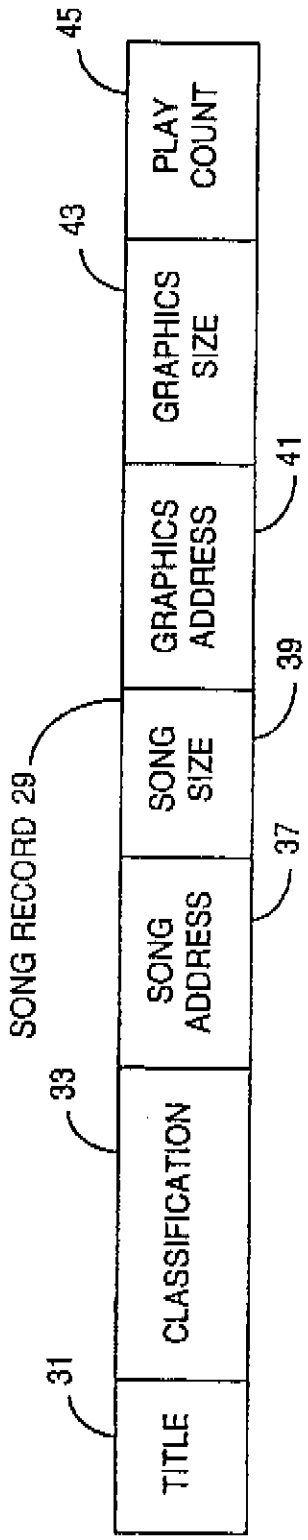

SONG RECORD 29
TITLE
31
CLASSIFICATION
33
SONG ADDRESS
37
SONG SIZE
39
GRAPHICS ADDRESS
41
GRAPHICS SIZE
43
PLAY COUNT
45

FIG. 3

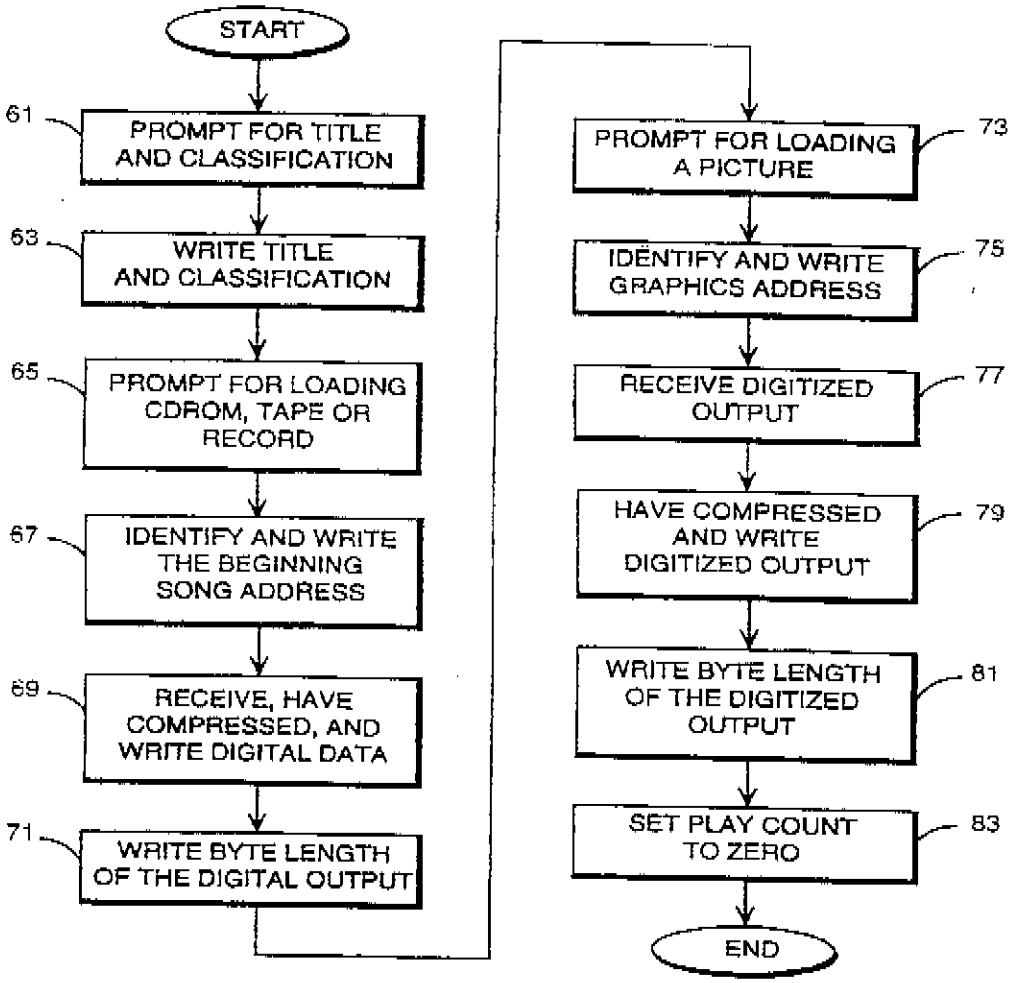

START
61
PROMPT FOR TITLE AND CLASSIFICATION
63
WRITE TITLE AND CLASSIFICATION
65
PROMPT FOR LOADING CDROM, TAPE OR RECORD
67
IDENTIFY AND WRITE THE BEGINNING SONG ADDRESS
69
RECEIVE, HAVE COMPRESSED, AND WRITE DIGITAL DATA
71
WRITE BYTE LENGTH OF THE DIGITAL OUTPUT
73
PROMPT FOR LOADING A PICTURE
75
IDENTIFY AND WRITE GRAPHICS ADDRESS
77
RECEIVE DIGITIZED OUTPUT
79
HAVE COMPRESSED AND WRITE DIGITIZED OUTPUT
81
WRITE BYTE LENGTH OF THE DIGITIZED OUTPUT
83
SET PLAY COUNT TO ZERO
END

FIG. 4A

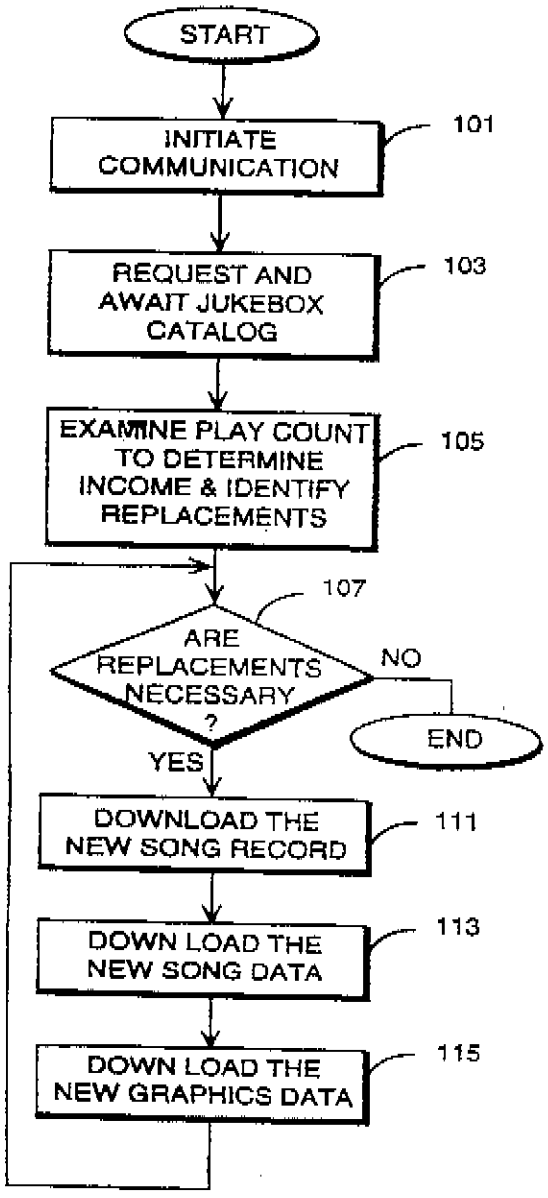

START
INITIATE COMMUNICATION
101
REQUEST AND AWAIT JUKEBOX CATALOG
103
EXAMINE PLAY COUNT TO DETERMINE INCOME & IDENTIFY REPLACEMENTS
105
107
ARE REPLACEMENTS NECESSARY ?
NO
END
YES
DOWNLOAD THE NEW SONG RECORD
111
DOWN LOAD THE NEW SONG DATA
113
DOWN LOAD THE NEW GRAPHICS DATA
115

FIG. 4B

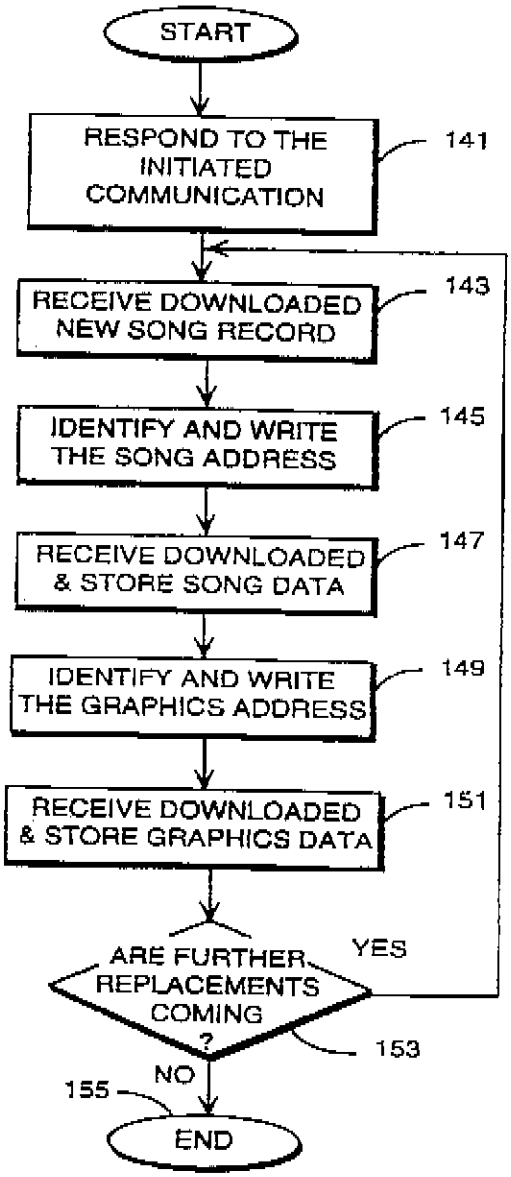
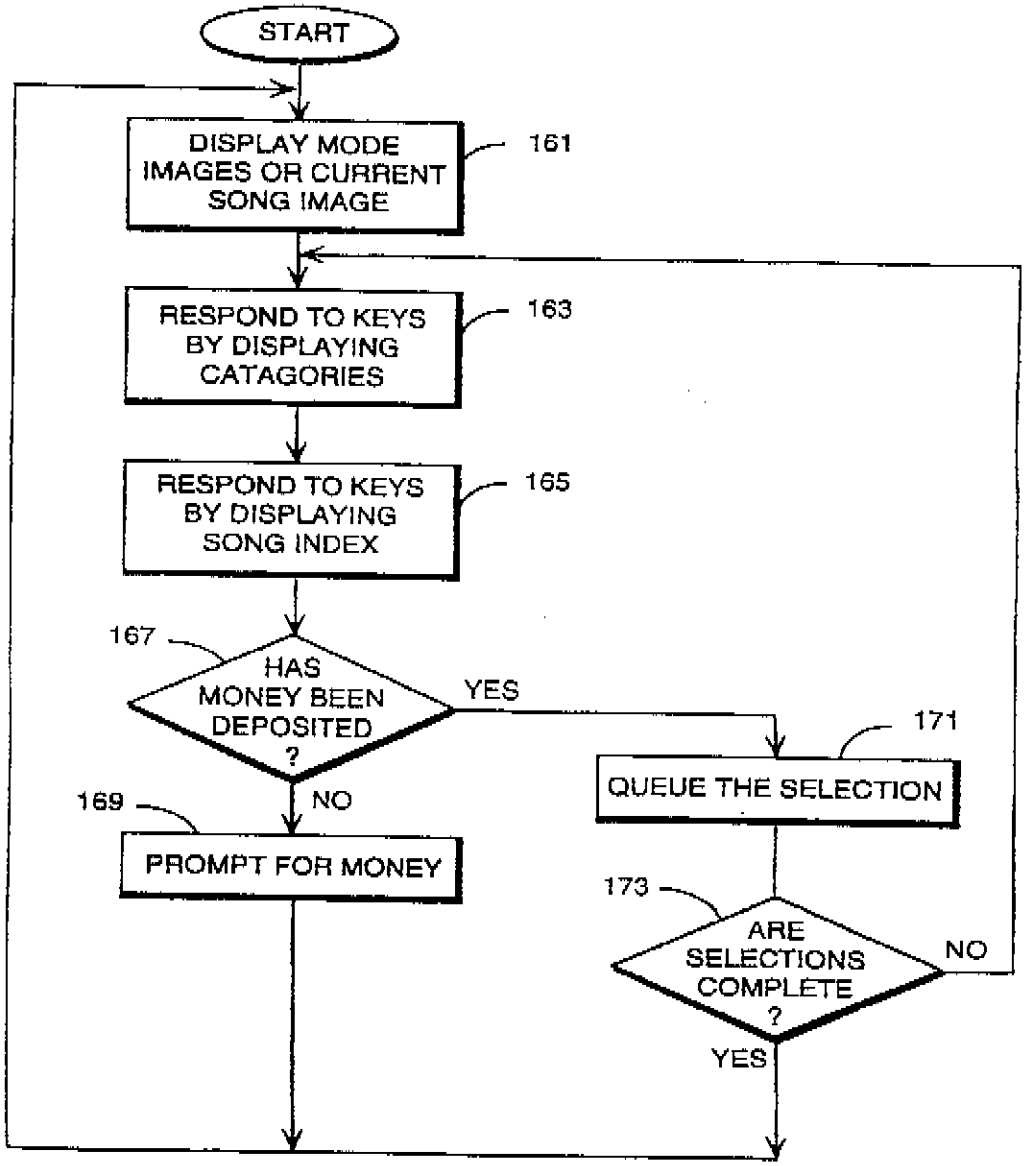

START
RESPOND TO THE INITIATED COMMUNICATION
141
RECEIVE DOWNLOADED NEW SONG RECORD
143
IDENTIFY AND WRITE THE SONG ADDRESS
145
RECEIVE DOWNLOADED & STORE SONG DATA
147
IDENTIFY AND WRITE THE GRAPHICS ADDRESS
149
RECEIVE DOWNLOADED & STORE GRAPHICS DATA
151
ARE FURTHER REPLACEMENTS COMING ?
YES
153
NO
155
END

FIG. 5


START
DISPLAY MODE IMAGES OR CURRENT SONG IMAGE
161
RESPOND TO KEYS BY DISPLAYING CATAGORIES
163
RESPOND TO KEYS BY DISPLAYING SONG INDEX
165
167
HAS MONEY BEEN DEPOSITED ?
YES
NO
169
PROMPT FOR MONEY
171
QUEUE THE SELECTION
173
ARE SELECTIONS COMPLETE ?
NO
YES

COMPUTER JUKEBOX AND COMPUTER JUKEBOX MANAGEMENT SYSTEM

CROSS REFERENCE TO RELATED APPLICATIONS

This application is a Continuation of application Ser. No. 09/076,849, filed May 12, 1998 which is a Continuation of application Ser. No. 08/584,253, filed Jan. 11, 1996, now U.S. Pat. No. 5,781,889, which is a Continuation of application Ser. No. 08/268,782, filed Jun. 30, 1994, now abandoned, which is a Continuation of application Ser. No. 07/846,707, filed Mar. 6, 1992, now U.S. Pat. No. 5,355,302.

FIELD OF THE INVENTION

The present invention relates generally to a jukebox system, and more particularly to such a system including one or more computer jukeboxes that can be managed from a remote location.

BACKGROUND OF THE INVENTION

Heretofore, an assortment of musical recordings found in a jukebox consists of a plurality of records, each record containing a specific recording. Traditionally, these records are grooved phonograph records.

After a patron makes a selection, the selected phonograph record is mechanically removed from a storage rack within the jukebox, and the phonograph record is placed upon rotating platform. A stylus which is connected to a speaker system is then placed upon the rotating phonograph record, resulting in the phonograph record being played by the jukebox. For each selection, a separate phonograph record must be removed from the storage rack in order to be played by the jukebox.

Conventional jukeboxes have also implemented compact disks as means for creating an assortment of musical songs. Compact disks provide the improved sound quality made possible by digital recordings. The same technique, however, is used to play compact disks. A separate compact disk corresponding to each selection must be removed from a storage rack in order for the jukebox to play the selection.

Updating conventional jukeboxes is a costly and time consuming task. Routemen must periodically travel to each jukebox location and replace the existing recordings of each jukebox with up-to-date records. The existing recordings are no longer used by the jukebox once removed, thus making the conventional method wasteful.

Routemen must also travel to each jukebox location to keep a tally of the number of times each musical recording is selected in order to determine royalty fees. It is known to provide a jukebox with a counter that keeps track of the number of times each musical recording is selected, but routemen must still travel to each jukebox location to obtain this information. Such a process requires an excessive number of people to visit jukebox location periodically and visually read the information off the counter within each jukebox. Since the number of jukeboxes in operation is quite large, the employment of routemen to obtain such data involves a considerable expense. Furthermore, the ever changing nature of the recording industry requires that such data be gathered frequently in order to keep abreast of a continually changing market.

OBJECTS AND SUMMARY OF THE INVENTION

Accordingly, it is a primary object of the present invention to provide a method and apparatus for managing a plurality of computer jukeboxes which is capable of eliminating the necessity for routemen to change records in the jukeboxes. The computer jukeboxes store recordings in memory, thus enabling routemen to simply load new recordings into the memory of each computer jukebox.

Another object of the present invention is to eliminate a necessity for routemen by enabling new recordings and selection menus to be downloaded to each computer jukebox via a transmission link. In that regard, it is an object of the present invention to provide a method and apparatus which eliminates the material waste usually associated with updating jukeboxes. Instead of throwing away old recordings and replacing them with new ones, as is the conventional procedure, the present invention eliminates this waste by enabling new recordings to simply be downloaded into the memory of each computer jukebox. The old recordings are simply erased, if necessary.

Another object of the present invention is to provide a method and apparatus which is capable of remotely obtaining jukebox usage data, thus eliminating a necessity for routemen to do this task. The present invention utilizes a computer jukebox, which as part of its software programming, stores the number of times each musical recording is played and the number of credits that have been awarded. This data is uploaded to a central control device via a transmission link.

An additional object of the present invention is to provide a method and apparatus utilizing modem computer technology to digitally store and play musical records. The jukebox of the present invention is basically a computer having a sophisticated audio production capability, the computer storing digitized song data in a computer memory. Because conventional jukeboxes maintain compact discs or records in the jukebox, theft of the compact disc/records has been a problem, this problem being eliminated by the present invention's utilization of a computer memory to store the digitized song data.

A further object of the present invention is to provide a method and apparatus capable of being used with the remote management of jukeboxes via public telephone lines without interfering with establishments' use of their own phone lines.

Other objects, features and advantages of the present invention will be readily apparent from the following description of certain preferred embodiments thereof taken in conjunction with the accompanying drawings, although variations and modifications may be effected without departing from the spirit and scope of the novel concepts of the disclosure.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a block diagram of the computer jukebox system of the present invention;

FIG. 2 is an illustration of the data structure of an individual song record stored in a master library catalog illustrated in FIG. 1;

FIG. 3 is a flow-chart illustrating the procedure for storing new songs in a bulk storage unit illustrated in FIG. 1;

FIGS. 4A and B are flow-charts illustrating the software procedures used by the central management system and the jukebox respectively in managing the song library of the jukebox; and

FIG. 5 is a flow-chart illustrating the specific operation of the jukebox in interfacing with a user.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

In accordance with the present invention as shown in FIG. 1, a central management system 11 monitors and updates the

available selection of music at a number of remotely located jukeboxes such as a jukebox **13**. Particularly, the central management system **11** monitors each jukebox **13** to determine the number of times each song has been played. From these numbers, the central management system **11** can calculate the royalty payments that are due. More importantly, the central management system **11** can identify those specific songs which need to be replaced in each jukebox on an individual basis, the central management system communicating replacement songs to each jukebox **13** to update the available music selection therein as needed.

Each jukebox **13** is basically a computer having sophisticated audio production capability wherein each computer jukebox **13** is programmed to play songs that have been digitally compressed and stored in a large-volume data storage unit **93**. The storage unit **93** may be a optical memory or any other available large volume nonvolatile computer memory that provides both read and write access.

The central management system **11** communicates with each computer jukebox **13** via a transmission link **15**. The central management system **11** and each jukebox **13** use respective modems **17** and **19** to maintain serial communication on the transmission link **15**. The transmission link **15** may be a cable system such as public or private telephone lines or the like. However, the modems **17** and **19** may be replaced with RF (radio frequency) transceivers and associated antennas. In the latter instance the transmission link **15** is an RF link.

Specifically, the central management system **11** includes a host computer **21** which maintains a master library **23** of songs and associated graphics which are stored in a compressed digital form in a bulk storage unit **25**. The bulk storage unit **25** is capable of storing vast amounts of digital data, and may be take the form of a read-write optical storage device. The host computer **21** indexes the master library **23** by using a master catalog **27** which is also maintained in the bulk storage unit **25**.

The master catalog **27** stores a song record **29**, as illustrated in FIG. **2**, for each song stored in the master library **23**. Each song record **29** associates information in the following fields: a) a title field **31**, containing the name of the song; b) a classification field **33**, containing the type of music, i.e., country, pop, jazz, classical, etc.; c) a song address field **37**, containing the beginning address in the bulk storage unit **25** of the compressed digital data of the song; d) a song size field **39**, containing the number of bytes in length of the compressed digital data; e) a graphics address field **41**, containing the beginning address in the bulk storage unit **25** of the compressed digital data of a graphics image, if any, to be associated with the song; f) a graphics size field **43**, containing the number of bytes in length of the compressed graphics image; and g) a play count field **45**, containing a count which indicates the number of times this specific song has been played. By parsing the master catalog **27**, the host computer **21** can quickly locate all available information relating to any available song. The master catalog **27** also stores data particular to each jukebox such as the number of times each available song has been played, the coin intake for that jukebox, etc. The data particular to each jukebox is uploaded from the jukebox to the central management system **11** to update the master catalog **27**.

Returning to FIG. **1**, in order to add to the master library **23** and associated master catalog **27**, the host computer **21** receives, has compressed and stores in the bulk storage unit **25** digital data representing the new song and associated pictorial graphics. The host computer **21** receives the digital data for storage from three sources: 1) a compact disc read only memory (CDROM) reader **51**, which reads CDROMs; 2) a graphics scanner **53**, which digitizes pictorial graphic images; and 3) an analog to digital (A/D) reader/converter **55**, which reads analog data from both tapes and records and then converts the analog data into digital data. A compression circuit **52** using an adaptive-delta, pulse-code-modulation compression scheme compresses the digital data before it is stored. Other compression schemes may also be used. The compression circuit **52** might also be fully replaced by a software algorithm which is executed by the host computer **21**.

FIG. **3** more specifically illustrates the operation of the host computer **21** in adding new songs to the master library **23**. At a block **61**, the user is initially prompted by the host computer **21** to enter a new song title and category. The host computer **21** writes this information into the title field **31** and classification field **33** of a new song record **29** at a block **63**. Next, at a block **65**, the host computer **21** prompts the user to place either a CDROM into the reader **51** or a record or tape into the reader/converter **55**. After the user has completed this placement, at a block **67** the host computer **21** identifies available storage space in the bulk storage unit **25** by analyzing the space in use as described in the current list of song records **29** in the master catalog **27**. The beginning address of this available storage space is placed in the song address field **37** of the new song record **29**. Thereafter, at a block **69**, the host computer **21** provides a read enable signal on a bus **50** to either the reader **51** or reader/converter **55**. Either the reader **51** or reader/converter **55** responds by reading and sending digital data representing the new song to the host computer **21** via the bus **50**. Utilizing a bus **54**, the host computer **21** forwards the digital data received to the compression circuit **52**, receives compressed digital data from the compression circuit **52** and writes the compressed digital data into the bulk storage unit **25**. At a block **71**, upon reaching the end of the digital data output, i.e., the end of a song, the host computer **21** writes the byte length of the digital output into the song size field **39**.

The host computer **21** at a block **73** prompts the user to load a picture, such as an album cover, into the graphics scanner **53**. At a block **75**, the host computer **21** identifies further available storage space in the bulk storage unit **25** and places the beginning address thereof into the graphics address field **41**. Once a picture is loaded, the host computer **21** at block **77**, using the bus **50**, provides a read enable signal to the scanner **53** which responds via bus **50** by digitizing the picture and transferring the digitized output to the host computer **21**. At a block **79**, using the bus **54**, the host computer **21** forwards the digitized data of the picture to the compression circuit **52**, receives compressed digitized data from the compression circuit **52**, and writes the compressed digitized data into the bulk storage unit **25**. At a block **81**, upon reaching the end of the digitized output, i.e., the end of the picture, the host computer **21** places the byte length of the digitized output into the graphics size field **43**. Finally, at a block **83**, the host computer **21** sets the play count field **45** to zero (0). This flow-chart is repeated as necessary until all of the new songs are added to the master library **23**. It is noted that the operator can also delete, modify or replace any specific song record **29** found in the master catalog **27** and master library **23**.

Returning to FIG. **1**, each computer jukebox **13** plays songs and displays graphics which are stored locally in the large-volume data storage unit **93**. The storage unit **93** of the jukebox **13** contains a subset of the songs found in the master library **23** maintained by the central management

system **11**. More specifically, the storage unit **93** of the jukebox **13** stores a song library **91** which is a corresponding subset of the master library **23**. The song library **91** contains all of the currently available song selections and associated pictorial graphics for the jukebox **13**. The storage unit **93** also stores a catalog **95** that is an index into the local song library **91**. The catalog **95** is similar to the master catalog **27**. Both the song library **91** and associated catalog **95** are monitored and updated by the central management system **11** as needed via the transmission link **15**. The jukebox **13** permits this monitoring and updating at any time with no impact on its end-user performance.

The jukebox **13** also includes a processing circuit **121** which contains a microprocessor **121A**, read only memory (ROM) **121B** and random access memory (RAM) **121C**. As in conventional computer systems, the microprocessor **121A** operates in accordance with the software program contained in the ROM **121B** and utilizes the RAM **121C** for scratch-pad memory. The processing circuit **121** may also contain a decompression circuit (not shown) or may perform decompression using a software algorithm stored in the ROM **121B** depending on the type of data compression scheme used by the central management system **11**. In either case, decompression is necessary to decompress the compressed data received from the central control system **11** so that the song can be played and associated graphics image displayed.

The processing circuit **121** controls the operation and flow of data into and out of the jukebox **13** through the modem **19** via a bus **124**. Using the bus **124**, the processing circuit **121** also controls a visual display **125**, one or more selection keys **123** and a coin/bill detector **126** to provide the user with an interactive interface to the jukebox **13**. The keys **123** provide signals representing user inputs such as displayed song selection. The display **125** displays alpha numeric information as well as pictorial graphics to interface with the user. The coin/bill detector **126** is responsive to one or more coins or bills input by a customer to determine whether the proper amount of money has been input and to provide money detect signals coupled to the processing circuit. The processing circuit **121** further controls, via the bus **124**, an audio reproduction circuit **127** coupled to a speaker system **129** along a bus **131** to provide an audio output to the user.

FIGS. **4A** and **4B** are flow-charts illustrating the software procedures respectively used by the central management system **11** and the jukebox **13** in managing the song library **91** of the jukebox **13**. At a block **101**, the central management system **11** initiates communication with one of the jukeboxes **13** via the transmission link **15**. Immediately thereafter, at a block **103**, the management system **11** requests that the jukebox data be sent including a copy of the catalog **95**. At a corresponding block **141**, the jukebox **13** responds by sending the copy of the catalog file as well as other jukebox data including total money intake over a period of time. The data sent from the jukebox to the management station may also include customer requests for new songs, a customer utilizing the display and keyboard of the jukebox **13** to enter song request data as discussed below. Thereafter, at a block **105**, by examining each play count field **45** in the copy of the catalog **95** received, the management system **11** determines the royalty amount due per song and whether to replace or update specific song entries stored in the jukebox **13**. The management system **11** also determines the total money intake from the play count information and compares this value to the total money intake value received from the jukebox to provide a check. At an inquiry block **107**, if no replacements are necessary, the management system **11** branches to a block **109** to terminate communication with the jukebox **13**. If however, replacements are necessary, the management system **11** branches to download the changes. Particularly, at a block **111**, the management system **11** downloads to the jukebox **13** the song records **29** of both the song to be replaced and the replacement song. In a corresponding block **143**, the jukebox **13** replaces the song record **29** in the catalog **95**. Thereafter, the jukebox **13** identifies available storage space in the storage unit **93** based on the song size field **39** of the new song, and writes the beginning address thereof into the song address field **37** in a corresponding block **145**. Afterwards, at a block **113**, the central management system **11** downloads the compressed digital data of the song to the jukebox **13**. At a corresponding block **147**, the jukebox **13** receives and writes the data into the song library **91**. Next, at a corresponding block **149**, the jukebox **13** identifies available storage space in the storage unit **93** based on the graphics size field **43**, and writes the beginning address thereof into the graphics address field **41** of the new song. Thereafter, at a block **115**, the management system **11** downloads the compressed digitized data of the picture to the jukebox **13**. The jukebox, at a corresponding block **151**, receives and writes the data into the song library **91**. Finally, the block **107** is again encountered. If further replacements need to be made, the blocks **111**, **113** and **115** are repeated until complete. At a corresponding block **153**, the jukebox similarly repeats the corresponding blocks **143** through **151** until no further replacements need to be made. A further block placed immediately above the block **107** may also be used, wherein the central management system **11** sends a delete, modify, add or replace command to the jukebox **13** before downloading into the song library **93**. In this way, the management system **11** receives additional flexibility in updating the jukebox **13**. It is noted that the jukebox **13** can also initiate communications with the management system **11** at predetermined times or if the jukebox determines that an event has occurred that the management system **11** should be aware of.

FIG. **5** is a flow-chart illustrating the specific operation of the processing circuit **121** of the jukebox **13** in interfacing with the user. At a block **161**, if no song selection is playing, the processing circuit **121** operates in a user attract mode, displaying a random sequence of available graphic images on the visual display **125**. More particularly, the processing circuit **121** randomly selects a starting address of the compressed graphics data from the available song records **29** in the catalog **95**. From that starting address, the circuit **121** retrieves the data from the song library **91** via the bus **124**. The circuit **121** decompresses and transfers the data along the bus **124** to the visual display **125** for display. Thereafter, the circuit **121** again randomly selects a starting address of available graphics data and this cycle repeats. If, however, a song selection is being played when the block **161** is encountered, the attract mode sequencing does not occur. Instead, the circuit **121** displays the associated graphics image of the song being played on the display **125**. During the attract mode the processing circuit **121** may also control the display **125** to present a prompt requesting customers to enter new song requests. The new song request data entered by a customer using the keyboard is stored and uploaded to the management system **11** to aid the system **11** in determining whether new song data should be downloaded to the jukebox.

At a block **163**, the processing circuit **121** responds to a signal indicating user interest from the selection keys **123** by providing on the display **125** those music categories, i.e., country, rock, jazz, etc., found in the catalog **95**. At a block

165, the circuit 121 responds to a signal indicating a category selection from the keys 123 by providing on the display 125 an index of available songs, arranged alphabetically either by artist or title, which can be scrolled and selected using the keys 123. Upon selection of a specific song, the circuit 121 encounters an inquiry block 167. If at the block 167 the circuit 121 determines from the signal received from the money detector 125 that a sufficient amount of money has not been deposited, a branch to a block 169 occurs. At the block 169, using the display 125, the circuit 121 prompts the user to deposit money into the coin/bill detector 126, then branches back to the block 161. However, if sufficient moneys have been deposited, the circuit 121 branches to a block 171 wherein the circuit 121 updates the play count field of the selected song's record in the catalog file 95 and money intake data stored in the memory. The circuit also places the song record 29 corresponding to the selected song into a queue of song records to be played. After the selection is queued, the circuit 121 encounters an inquiry block 153. If the total number of selections purchased have been selected, the circuit 121 branches back to the block 161. Otherwise, if further purchased selections are forthcoming, the circuit 121 branches back to the block 163. In this manner, all of the selections are made and placed in the queue. Upon completion of playing a queued-up, selected song, the circuit 121 removes the corresponding song record 29 from the queue, selects the next song record in the queue, begins to play that next song, and executes the block 161. It is noted that the song queue can be displayed on the display 125 in order to show customers what songs have already been selected prior to making their selection.

More specifically, referring back to FIG. 1, once a specific song has been selected and queued-up, the processing circuit 121 first identifies the beginning address of the compressed digital data from the song address field 37 of the song record 29 in the queue. From this address, using the bus 124, the circuit 121 reads the compressed digital data out of the storage unit 93, decompresses that data, and sends the decompressed digital data to the audio reproduction circuit 127. The audio reproduction circuit 127, commonly found in CDROM readers and associated amplifiers, converts the digital data to an analog signal which is amplified and used to drive the speaker system 129 via the bus 131. After a selected song finishes playing, the processing circuit 121 deletes the song record 29 of the selected song from the queue, increments the play count field 45 associated with that song in the catalog 95, and begins playing the next selected song in the queue if any exists. The process set forth in the flow-chart detailed in FIG. 5 is then repeated.

While the present invention is being described and illustrated in accordance with the preferred embodiment enabling new recordings and computer usage data to be transferred via the transmission line 15, the monitoring and updating may also be directly transferred. In this latter embodiment, routemen physically visit the location of each computer jukebox 13. During these visits, the routemen carry a portable management system 181 which has only a subset of potential replacement songs stored in a subset library and associated catalog (not shown) on a portable bulk storage unit 183. The subset library is loaded by the portable management system 181 onto the portable bulk storage unit 183 either directly from the bulk storage unit 25 or indirectly as is initially done by the central management system 11 (described above). In all other ways, the portable management system 181 operates the same as the central management system 11, collecting the catalog 95 of each jukebox 13 and updating or replacing as necessary. To accomplish this, the portable management system 181 communicates at a very high rate of speed with the jukebox 13 via a parallel communication link 185 and a direct memory access (DMA) link 187.

Additionally, the routemen may simply exchange the "old" storage unit 93 with a pre-loaded storage unit (not shown). The central management system 11 may later read the "old" storage unit 93 to gather the information from the catalog 95. Such an embodiment still enjoys the other advantages made possible by the computer jukeboxes 13 described herein.

Additionally, it is to be understood that the embodiments of the present invention described hereinabove are merely illustrative and that other modifications and adaptations may be made without departing from the scope of the appended claims.

We claim:

1. A computer jukebox for playing songs transferred to and stored in the computer jukebox, the computer jukebox comprising:

at least one communication interface for receiving digitized song data and for receiving an associated song record, the song record including song identity data comprising at least one of a song title, a song category, song address, song size, graphics address, graphics size, and play count;

a memory storing the digitized song data and the song identity data;

a display presenting song selections based on the song identity data;

a song selector for determining from the song selections a selected digitized song to be played on the computer jukebox;

at least one audio speaker;

a processor operative to retrieve digitized song data corresponding to the selected digitized song, and operative to store the digitized song data and the song identity data received by the at least one communication interface in the memory; and

a digital to analog converter coupled between the processor and the audio speaker to convert the digitized song data to an analog signal for the audio speaker.

2. A computer jukebox according to claim 1, wherein the memory stores the digitized song data in a digitized song library and stores the song identity data in a song catalog.

3. A computer jukebox according to claim 1, wherein the display presents available song selections according to at least two of song genre, song artist and song title associated with each digitized song.

4. A computer jukebox according to claim 1, wherein the display presents the song selections with associated graphics identified by the graphics address, the song selections arranged alphabetically according to at least one of a song artist and the song title associated with each digitized song.

5. A computer jukebox according to claim 2, wherein the processor is responsive to the song selector for scrolling the song selections on the display.

6. A computer jukebox according to claim 4, wherein the processor is operable to display a user attract mode that shows graphics identified by the graphics address when no digitized song is playing.

7. A computer jukebox according to claim 1, wherein the processor is further operative to create at least one play count for a digitized song and to create associated money intake data for the digitized song.

8. A computer jukebox according to claim 7, wherein the processor is further operative to transfer the associated money intake data and the play count through the at least one communication interface to a remote location for accounting.

9. A central management system for distributing digitized songs to a computer jukebox, the central management system comprising:

at least one communication interface for transmitting digitized song data and for transmitting an associated song record, the song record including song identity data comprising at least one of a song title, a song category, song address, song size, graphics address, graphics size, and play count;

a memory storing digitized song data and song identity data; and

a processor operative to retrieve selected digitized song data and transmit the selected digitized song data to a computer jukebox through the at least one communication interface, the processor further operative to retrieve song identity data associated with the selected digitized song data, build an associated song record using the song identity data, and transmit the associated song record to the computer jukebox through the at least one communication interface.

10. The central management system of claim 9, wherein the memory stores digitized song data in a digitized song library and stores the song identity data in a song catalog.

11. The central management system of claim 9, wherein the song identity data includes the graphics address identifying a graphic associated with a digitized song, and wherein the processor is further operative to transmit the digitized graphic over the at least one communication interface to the computer jukebox.

12. The central management system of claim 10, wherein the processor is further operative to receive from a computer jukebox and store a digitized song play count and associated money intake data for the digitized song.

13. The central management system of claim 12, wherein the processor is further operative to determine royalties based on the associated money intake data.

14. The central management system of claim 10, wherein the processor is further operative to receive from the computer jukebox and store a digitized song play count, determine whether to replace a digitized song associated with the digitized song play count in the computer jukebox, and transmit replacement digitized song data and a replacement song record to the computer jukebox.

15. A computer jukebox network, comprising:

a central management system for distributing digitized songs stored in a digitized song library to a computer jukebox, the central management system comprising:

at least one system communication interface for transmitting digitized song data and for transmitting an associated song record, the song record including song identity data comprising at least one of a song title, a song category, song address, song size, graphics address, graphics size, and play count;

a system memory storing digitized song data and song identity data; and

a system processor operative to retrieve selected digitized song data and transmit the selected digitized song data to a computer jukebox through the at least one communication interface, the processor further operative to retrieve song identity data associated with the selected digitized song data, build an associated song record using the song identity data, and transmit the associated song record to the computer jukebox through the at least one communication interface; and

a plurality of computer jukeboxes for playing songs stored in a memory in the computer jukebox, at least one computer jukebox comprising:

at least one jukebox communication interface for receiving digitized song data and for receiving an associated song record, the song record including song identity data comprising at least one of a song title, a song category, song address, song size, graphics address, graphics size, and play count;

a jukebox memory storing the digitized song data and the song identity data;

a display presenting song selections based on the song identity data;

a song selector for determining from the song selections a selected digitized song to be played on the computer jukebox;

at least one audio speaker;

a processor operative to retrieve digitized song data corresponding to the selected digitized song, and operative to store the digitized song data and the song identity data received by the at least one communication interface in the memory; and

a digital to analog converter coupled between the processor and the audio speaker to convert the digitized song data to an analog signal for the audio speaker.

16. The computer jukebox network of claim 15, wherein the system processor is further operative to receive from the computer jukebox and store a digitized song play count, determine whether to replace a digitized song associated with the digitized song play count in the computer jukebox, and transmit replacement digitized song data and a replacement song record to the computer jukebox.

17. The computer jukebox network of claim 15, wherein the jukebox processor is further operative to create at least one play count for a digitized song and to create associated money intake data for the digitized song.

18. The computer jukebox network of claim 17, wherein the jukebox processor is further operative to transfer the associated money intake data and the play count through the at least one jukebox communication interface to a remote location for accounting.

19. The computer jukebox network of claim 15, wherein the processor is further operative to receive from a computer jukebox and store a digitized song play count and associated money intake data.

20. The computer jukebox network of claim 19, wherein the processor is further operative to determine royalties based on the associated money intake data.

21. The computer jukebox network of claim 15, wherein the display presents the song selections with associated graphics identified by the graphics address, the song selections arranged alphabetically according to at least one of a song artist and the song title associated with each digitized song.

22. A method for receiving and playing songs using a computer jukebox, the method comprising:

receiving at the computer jukebox digitized song data and an associated song record, the song record including song identity data comprising at least one of a song title, a song category, song address, song size, graphics address, graphics size, and play count;

storing the digitized song data and the song identity data in a memory in the computer jukebox;

presenting song selections based on the song identity data on a display;

determining from the song selections a selected digitized song to be played on the computer jukebox based on input from a song selector;

retrieving digitized song data corresponding to the selected digitized song;

converting the digitized song data to an analog signal; and

applying the analog signal to an audio speaker.

23. The method of claim **22**, wherein the step of storing further comprises storing the digitized song data in a digitized song library and storing the song identity data in a song catalog.

24. A computer jukebox according to claim **22**, wherein the step of presenting further comprises presenting available song selections according to at least two of song genre, song artist and song title associated with each digitized song.

25. The method of claim **22**, wherein the step of presenting further comprises presenting the song selections with associated graphics identified by the graphics address, the song selections arranged alphabetically according to at least one of a song artist and the song title associated with each digitized song.

26. The method of claim **22**, further comprising the step of creating at least one play count for a digitized song and creating associated money intake data for the digitized song.

27. The method of claim **22**, further comprising the step of replacing a digitized song in the computer jukebox based on the digitized song play count by receiving and storing in the memory the replacement digitized song data and a replacement song record.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

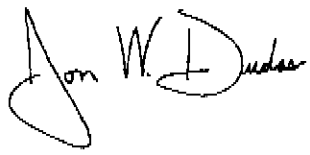
PATENT NO. : 6,381,575 B1
DATED : April 30, 2002
INVENTOR(S) : John R. Martin and Michael L. Tillery

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

Column 11,
Line 1, delete "presenting song selections based on the song identity data on a display;" and substitute therefor -- presenting at least one of a user attract mode and song selections based on the song identity data on a display; --

Signed and Sealed this

Thirteenth Day of January, 2004



JON W. DUDAS
Acting Director of the United States Patent and Trademark Office

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 6,381,575 B1
DATED : April 30, 2002
INVENTOR(S) : John R. Martin and Michael L. Tillery

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

Column 8,
Line 31, delete "a display presenting song selections based on the song identity data;" and substitute therefor -- a display adapted for presenting song selections based on the song identity data and a user attract mode; --
Line 37, delete "a processor operative to retrieve digitized song data corresponding to the selected digitized song, and operative to store the digitized song data and the song identity data received by the at least one communication interface in the memory;" and substitute therefor -- a processor operative to present on the display at least one of a user attract mode and song selections based on song identity data, and operative to retrieve digitized song data corresponding to the selected digitized song, and operative to store the digitized song data and the song identity data received by the at least one communication interface in the memory; --

Column 9,
Line 6, delete "at least one communication interface for transmitting digitized song data and for transmitting an associated song record, the song record including song identity data comprising at least one of a song title, a song category, song address, song size, graphics address, graphics size, and play count;" and substitute therefor -- at least one communication interface adapted for transmitting user attract data, for transmitting digitized song data and for transmitting an associated song record, the song record including song identity data comprising at least one of a song title, a song category, song address, song size, graphics address, graphics size, and play count; --
Line 15, delete "a memory storing digitized song data and song identity data;" and substitute therefor -- a memory storing digitized song data and song identity data and adapted for storing user attract data; --

Column 10,
Line 15, delete "a display presenting song selections based on the song identity data;" and substitute therefor -- a display adapted for presenting song selections based on the song identity data and a user attract mode; --
Line 21, delete "a processor operative to retrieve digitized song data corresponding to the selected digitized song, and operative to store the digitized song data and the song identity data received by the at least one communication interface in the memory;" and substitute therefor -- a processor operative to present on the display at least one of a user attract mode and song selections based on song identity data, operative to retrieve digitized song data corresponding to the selected digitized song, and operative to store the digitized song data, and the song identity data received by the at least one communication interface in the memory; --

UNITED STATES PATENT AND TRADEMARK OFFICE

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Column 11,
Line 1, delete "presenting song selections based on the song identity data on a display;" and substitute therefor -- presenting at least one of a user attract mode and song selections based on the song identity data on a display; --

This certificate supersedes Certificate of Correction issued January 13, 2004.

Signed and Sealed this

Third Day of February, 2004

JON W. DUDAS
Acting Director of the United States Patent and Trademark Office

EXHIBIT F

US006970834B2

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

(10) **Patent No.: US 6,970,834 B2**
(45) **Date of Patent: *Nov. 29, 2005**

(54) **ADVERTISEMENT DOWNLOADING COMPUTER JUKEBOX**

(75) Inventors: **John R. Martin**, Rockford, IL (US); **Michael L. Tillery**, Rockford, IL (US); **Samuel N. Zammuto**, Rockford, IL (US)

(73) Assignee: **Arachnid, Inc.**, Rockford, IL (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 102 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **10/300,147**

(22) Filed: **Nov. 20, 2002**

(65) **Prior Publication Data**

US 2003/0074219 A1 Apr. 17, 2003

Related U.S. Application Data

(60) Continuation of application No. 09/309,400, filed on May 11, 1999, now abandoned, which is a continuation of application No. 08/975,612, filed on Nov. 12, 1997, now Pat. No. 5,930,765, which is a continuation-in-part of application No. 08/638,022, filed on Apr. 25, 1996, now Pat. No. 5,848,398, which is a continuation-in-part of application No. 08/584,253, filed on Jan. 11, 1996, now Pat. No. 5,781,889, which is a continuation of application No. 08/268,782, filed on Jun. 30, 1994, now abandoned, which is a division of application No. 07/846,707, filed on Mar. 6, 1992, now Pat. No. 5,355,302, which is a continuation-in-part of application No. 07/538,981, filed on Jun. 15, 1990, now abandoned.

(51) **Int. Cl.**[7] **G06F 17/00**

(52) **U.S. Cl.** **705/14**; 369/30.06

(58) **Field of Search** 705/14; 369/30.06, 369/30.07; 84/601; 360/28, 39, 55; 700/234, 700/241

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Primary Examiner—Thomas A. Dixon
(74) *Attorney, Agent, or Firm*—McAndrews, Held & Malloy

(57) **ABSTRACT**

A computer jukebox capable of receiving and storing advertisement data representing a plurality of advertisement from a remote central management system by way of a transmission link between the computer jukebox and the central management system, comprising a communication interface, a programmable computer memory and a processor. The computer jukebox downloads advertisement data. The communication interface receives advertisement data from the remote central management system by way of the transmission link. The advertisement data represents an identity of each of the plurality of advertisements, and data representing times for each of the advertisements to be run. The programmable computer memory stores the advertisement data. The processor runs the plurality of advertisements according to the advertisement data.

17 Claims, 5 Drawing Sheets

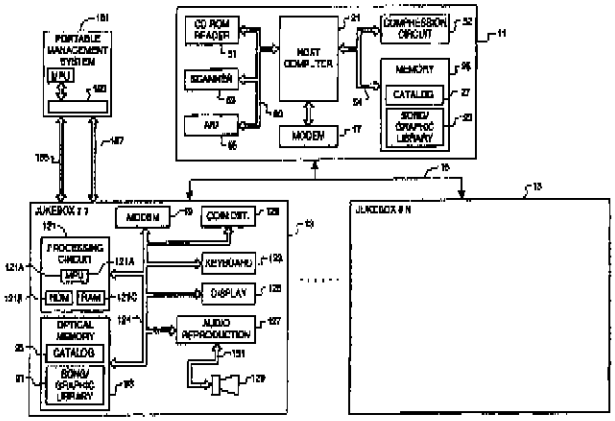

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Fig. 1

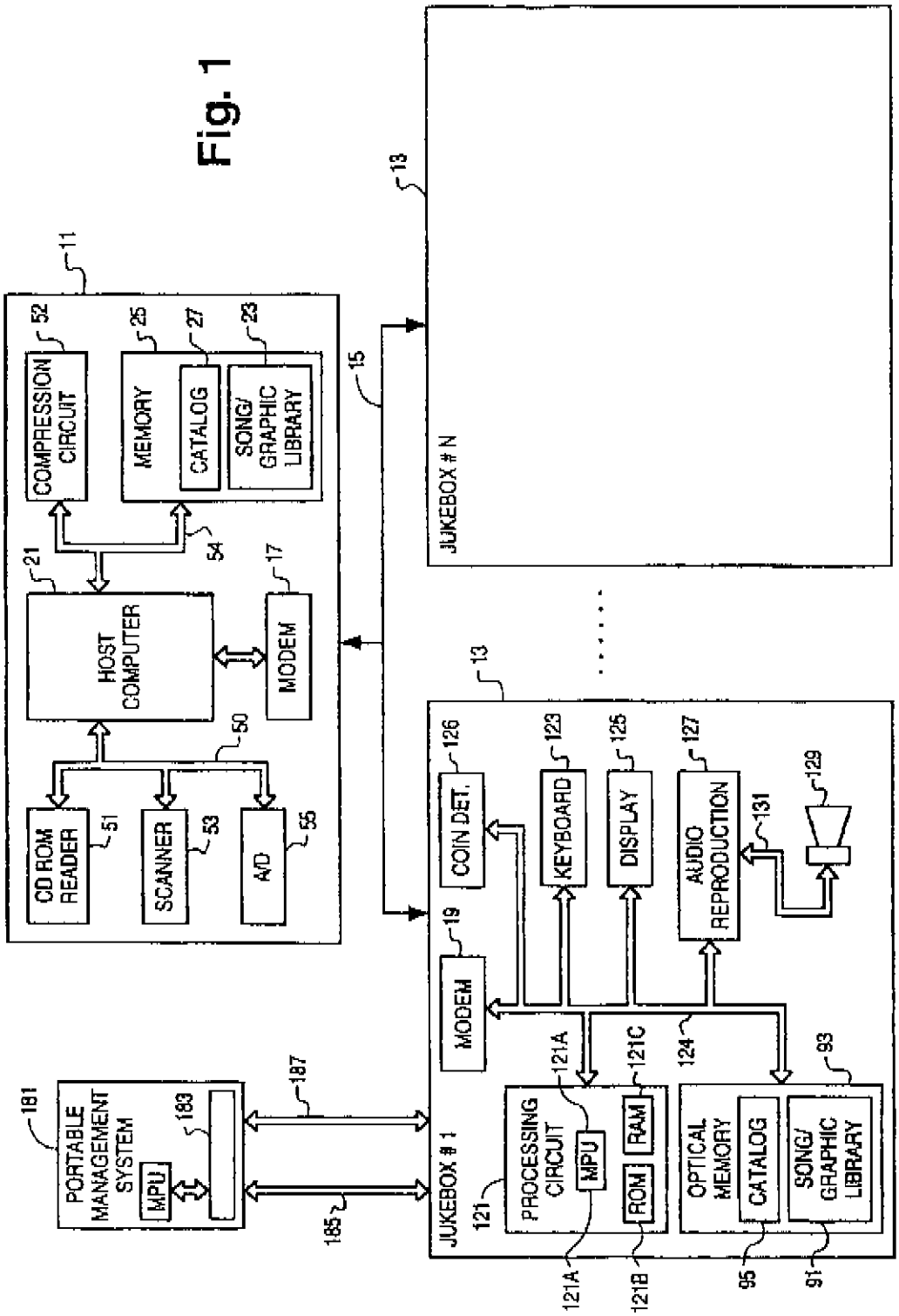

JUKEBOX # N
13
11
52
COMPRESSION CIRCUIT
25
MEMORY
27
CATALOG
23
SONG/ GRAPHIC LIBRARY
15
21
HOST COMPUTER
54
17
MODEM
50
CD ROM READER
51
SCANNER
53
A/D
55
13
126
COIN DET.
123
KEYBOARD
125
DISPLAY
127
AUDIO REPRODUCTION
129
131
19
MODEM
121A
121C
124
93
181
PORTABLE MANAGEMENT SYSTEM
MPU
183
187
185
JUKEBOX # 1
121
PROCESSING CIRCUIT
MPU
RAM
ROM
OPTICAL MEMORY
CATALOG
SONG/ GRAPHIC LIBRARY
121A
121B
95
91

Fig. 2

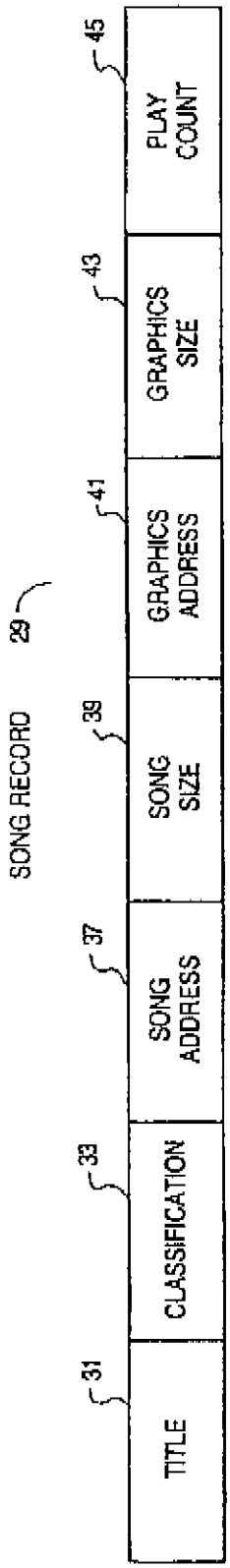

SONG RECORD
29
31
TITLE
33
CLASSIFICATION
37
SONG ADDRESS
39
SONG SIZE
41
GRAPHICS ADDRESS
43
GRAPHICS SIZE
45
PLAY COUNT

Fig. 3

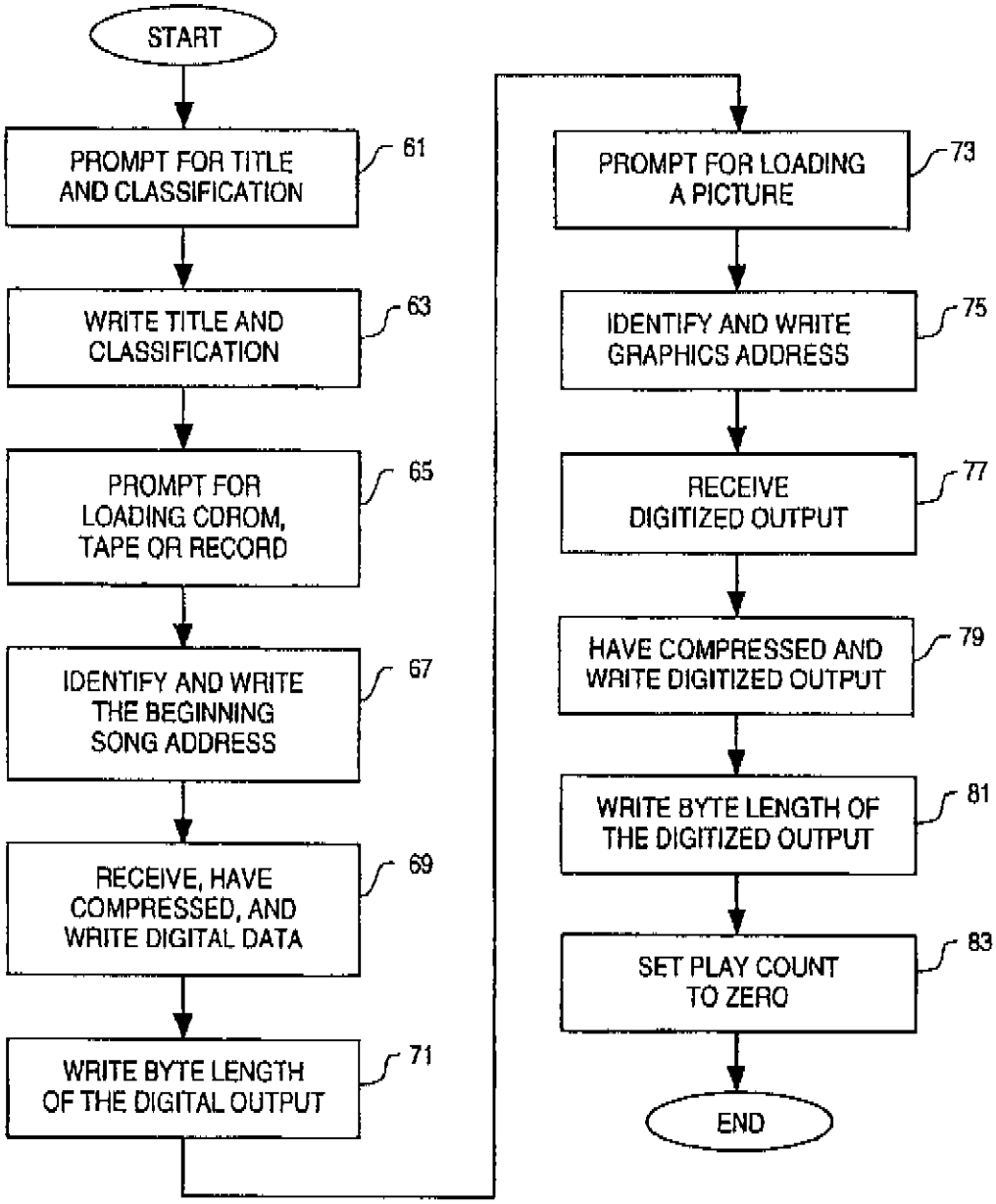

START
PROMPT FOR TITLE AND CLASSIFICATION
61
WRITE TITLE AND CLASSIFICATION
63
PROMPT FOR LOADING CDROM, TAPE OR RECORD
65
IDENTIFY AND WRITE THE BEGINNING SONG ADDRESS
67
RECEIVE, HAVE COMPRESSED, AND WRITE DIGITAL DATA
69
WRITE BYTE LENGTH OF THE DIGITAL OUTPUT
71
PROMPT FOR LOADING A PICTURE
73
IDENTIFY AND WRITE GRAPHICS ADDRESS
75
RECEIVE DIGITIZED OUTPUT
77
HAVE COMPRESSED AND WRITE DIGITIZED OUTPUT
79
WRITE BYTE LENGTH OF THE DIGITIZED OUTPUT
81
SET PLAY COUNT TO ZERO
83
END

Fig. 4A

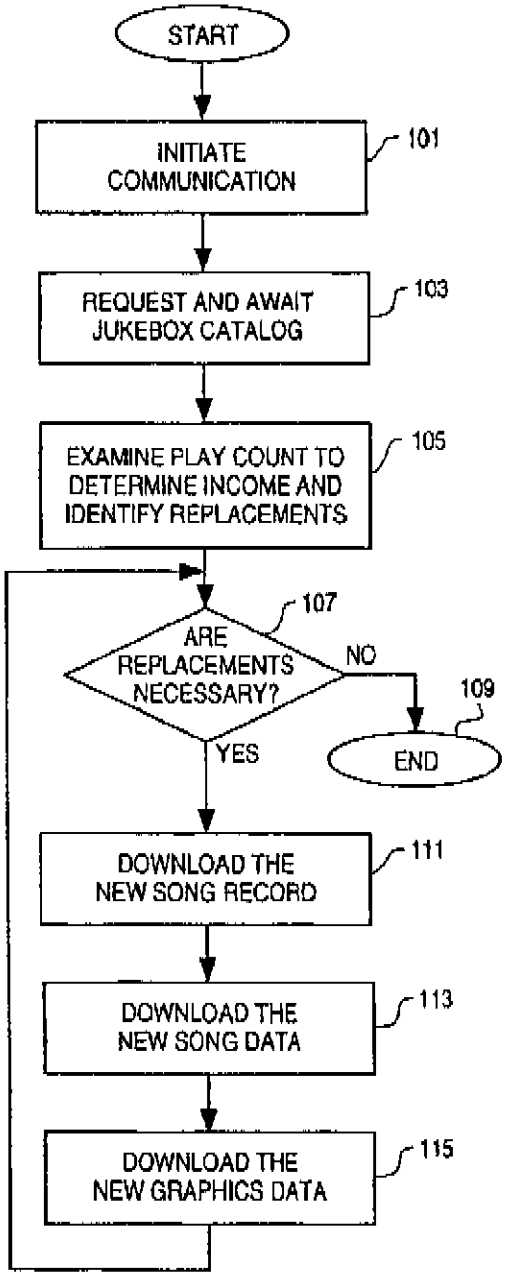

START
INITIATE COMMUNICATION
101
REQUEST AND AWAIT JUKEBOX CATALOG
103
EXAMINE PLAY COUNT TO DETERMINE INCOME AND IDENTIFY REPLACEMENTS
105
ARE REPLACEMENTS NECESSARY?
107
NO
YES
END
109
DOWNLOAD THE NEW SONG RECORD
111
DOWNLOAD THE NEW SONG DATA
113
DOWNLOAD THE NEW GRAPHICS DATA
115

Fig. 4B

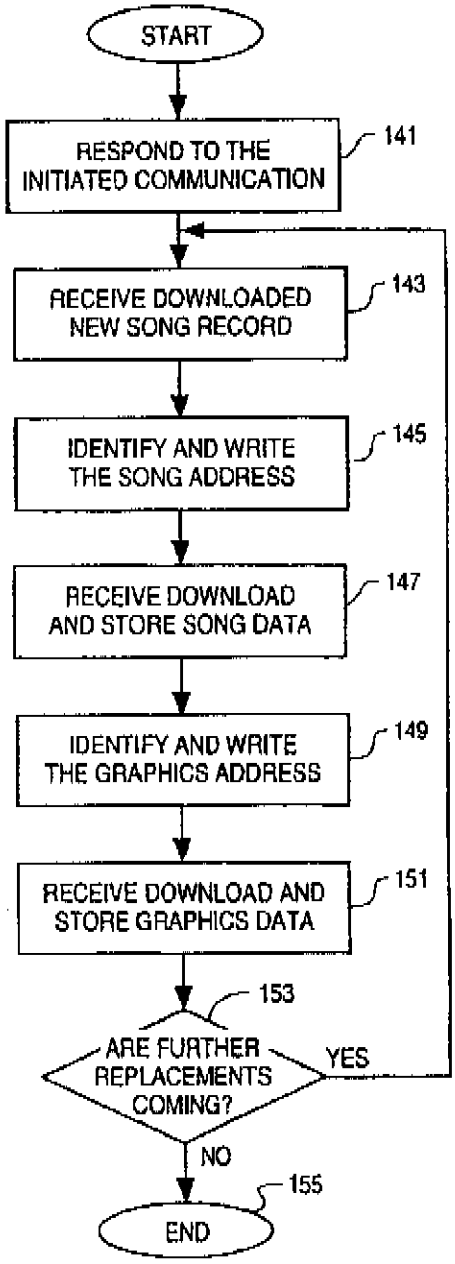
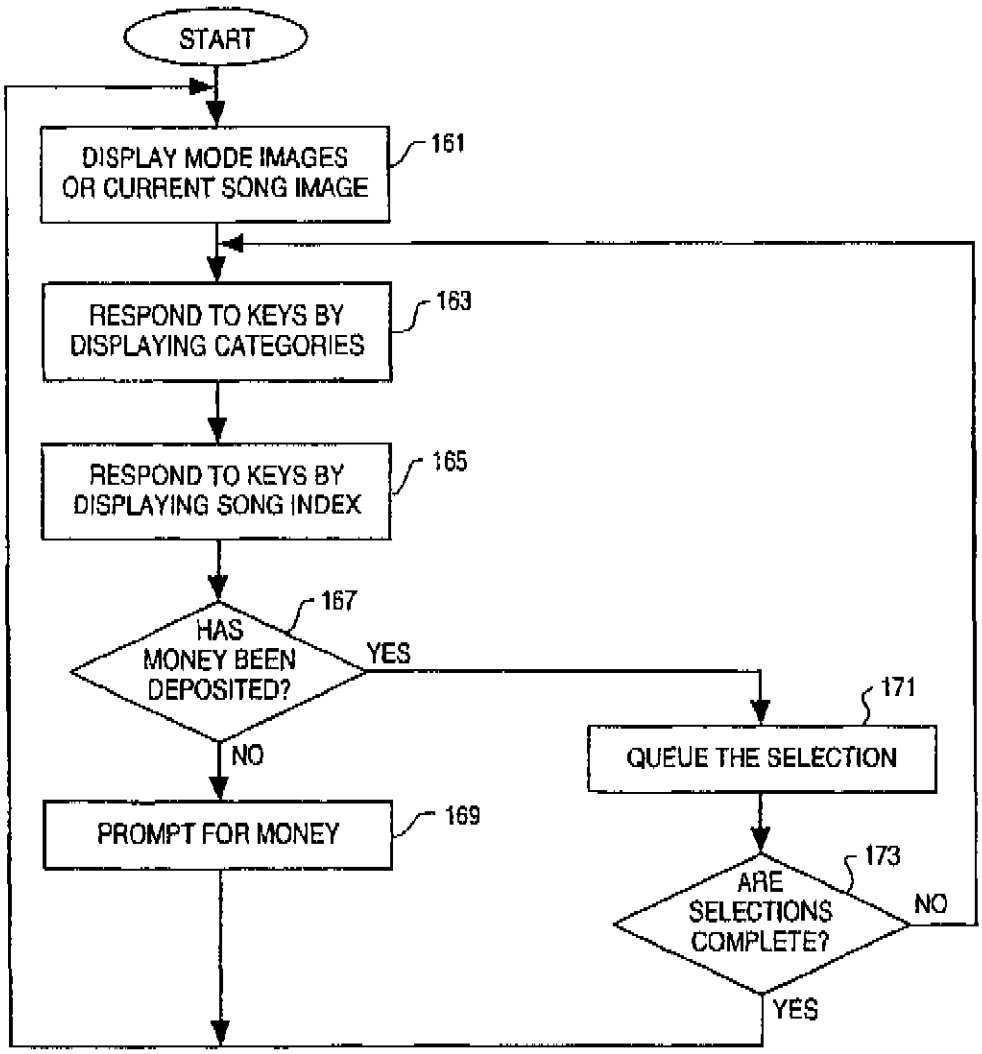

START
RESPOND TO THE INITIATED COMMUNICATION
141
RECEIVE DOWNLOADED NEW SONG RECORD
143
IDENTIFY AND WRITE THE SONG ADDRESS
145
RECEIVE DOWNLOAD AND STORE SONG DATA
147
IDENTIFY AND WRITE THE GRAPHICS ADDRESS
149
RECEIVE DOWNLOAD AND STORE GRAPHICS DATA
151
ARE FURTHER REPLACEMENTS COMING?
153
YES
NO
END
155

Fig. 5


START
DISPLAY MODE IMAGES OR CURRENT SONG IMAGE
161
RESPOND TO KEYS BY DISPLAYING CATEGORIES
163
RESPOND TO KEYS BY DISPLAYING SONG INDEX
165
HAS MONEY BEEN DEPOSITED?
167
YES
NO
PROMPT FOR MONEY
169
QUEUE THE SELECTION
171
ARE SELECTIONS COMPLETE?
173
NO
YES

ADVERTISEMENT DOWNLOADING COMPUTER JUKEBOX

RELATED APPLICATIONS

This application is a continuation of Ser. No. 09/309,400, filed May 11, 1999, now abandoned which is a continuation of Ser. No. 08/975,612, filed Nov. 21, 1997 now U.S. Pat No. 5,930,765, which is a continuation-in-part of Ser. No. 08/638,022, filed Apr. 25, 1996, now U.S. Pat. No. 5,848,398, which is a continuation-in-part of Ser. No. 08/584,253, filed Jan. 11, 1996, now U.S. Pat. No. 5,781,889, which is a continuation of Ser. No. 08/268,782, filed Jun. 30, 1994, now abandoned, which is a divisional of Ser. No. 07/846,707, filed Mar. 6, 1992, now U.S. Pat. No. 5,355,302, which is a continuation in part of Ser. No. 07/538,981, filed Jun. 15, 1990, now abandoned.

BACKGROUND OF THE INVENTION

The present invention relates generally to a jukebox system, and more particularly to such a system including one or more computer jukeboxes that can be managed from a remote location.

Heretofore, an assortment of musical recordings found in a jukebox consists of a plurality of records, each record containing a specific recording. Traditionally, these records are grooved phonograph records. After a patron makes a selection, the selected phonograph record is mechanically removed from a storage rack within the jukebox, and the phonograph record is placed upon rotating platform. A stylus which is connected to a speaker system is then placed upon the rotating phonograph record, resulting in the phonograph record being played by the jukebox. For each selection, a separate phonograph record must be removed from the storage rack in order to be played by the jukebox.

Conventional jukeboxes have also implemented compact disks as means for creating an assortment of musical songs. Compact disks provide the improved sound quality made possible by digital recordings. The same technique, however, is used to play compact disks. A separate compact disk corresponding to each selection must be removed from a storage rack in order for the jukebox to play the selection. Updating conventional jukeboxes is a costly and time consuming task. Routemen must periodically travel to each jukebox location and replace the existing recordings of each jukebox with up-to-date records. The existing recordings are no longer used by the jukebox once removed, thus making the conventional method wasteful.

Routemen must also travel to each jukebox location to keep a tally of the number of times each musical recording is selected in order to determine royalty fees. It is known to provide a jukebox with a counter that keeps track of the number of times each musical recording is selected, but routemen must still travel to each jukebox location to obtain this information. Such a process requires an excessive number of people to visit each jukebox location periodically and visually read the information off the counter within each jukebox. Since the number of jukeboxes in operation is quite large, the employment of routemen to obtain such data involves a considerable expense. Furthermore, the ever changing nature of the recording industry requires that such data be gathered frequently in order to keep abreast of a continually changing market.

Conventional jukeboxes display a selection menu allowing a patron to select a particular recording that he or she may want to hear. When that song is being played, a video accompanying the song is typically displayed on the screen. However, when the jukebox is not being used either the selection menu is still continually displayed or the screen is blank.

BRIEF SUMMARY OF THE INVENTION

Accordingly, it is a primary object of the present invention to provide a method and apparatus for managing a plurality of computer jukeboxes which is capable of eliminating the necessity for routemen to change records in the jukeboxes. The computer jukeboxes store recordings in memory, thus enabling routemen to simply load new recordings into the memory of each computer jukebox.

Another object of the present invention is to eliminate a necessity for routemen by enabling new recordings and selection menus to be downloaded to each computer jukebox via a transmission link. In that regard, it is an object of the present invention to provide a method and apparatus which eliminates the material waste usually associated with updating jukeboxes. Instead of throwing away old recordings and replacing them with new ones, as is the conventional procedure, the present invention eliminates this waste by enabling new recordings to simply be downloaded into the memory of each computer jukebox. The old recordings are simply erased, if necessary.

Another object of the present invention is to provide a method and apparatus which is capable of remotely obtaining jukebox usage data, thus eliminating a necessity for routemen to do this task. The present invention utilizes a computer jukebox, which as part of its software programming, stores the number of times each musical recording is played and the number of credits that have been awarded. This data is uploaded to a central control device via a transmission link.

An additional object of the present invention is to provide a method and apparatus utilizing modern computer technology to digitally store and play musical records. The jukebox of the present invention is basically a computer having a sophisticated audio production capability, the computer storing digitized song data in a computer memory. Because conventional jukeboxes maintain compact discs or records in the jukebox, theft of the compact disc/records has been a problem, this problem being eliminated by the present invention's utilization of a computer memory to store the digitized song data.

A further object of the present invention is to provide a method and apparatus capable of being used with the remote management of jukeboxes via public telephone lines without interfering with an establishments' use of their own phone lines.

Still a further object of the present invention is to provide a method and apparatus for downloading and storing advertisements to a computer jukebox, and then running the advertisements on a screen associated with the computer jukebox at specified times. Additionally, the jukebox may also be associated with an electronic game so that advertisements not be run on a screen of the electronic game when the game is not being played.

It is a related object of the present invention to track the number of times a particular advertisement is actually run so that the advertiser can be appropriately billed. This information is uploaded to the central control device via the transmission link.

Other objects, features and advantages of the present invention will be readily apparent from the following description of certain preferred embodiments thereof taken

in conjunction with the accompanying drawings, although variations and modifications may be effected without departing from the spirit and scope of the novel concepts of the disclosure.

BRIEF DESCRIPTION OF SEVERAL VIEWS OF THE DRAWINGS

FIG. **1** is a block diagram of the computer jukebox system of the present invention.

FIG. **2** is an illustration of the data structure of an individual song record stored in a master library catalog illustrated in FIG. **1**.

FIG. **3** is a flow-chart illustrating the procedure for storing new songs in a bulk storage unit illustrated in FIG. **1**.

FIGS. **4**A and B are flow-charts illustrating the software procedures used by the central management system and the jukebox respectively in managing the song library of the jukebox.

FIG. **5** is a flow-chart illustrating the specific operation of the jukebox in interfacing with a user.

DETAILED DESCRIPTION OF THE INVENTION

In accordance with the, present invention as shown in FIG. **1**, a central management system **11** monitors and updates the available selection of music at a number of remotely located jukeboxes such as a jukebox **13**. Particularly, the central management system **11** monitors each jukebox **13** to determine the number of times each song has been played. From these numbers, the central management system **11** can calculate the royalty payments that are due. More importantly, the central management system **11** can identify those specific songs which need to be replaced in each jukebox on an individual basis, the central management system communicating replacement songs to each jukebox **13** to update the available music selection therein as needed.

Each jukebox **13** is basically a computer having sophisticated audio production capability wherein each computer jukebox **13** is programmed to play songs that have been digitally compressed and stored in a large-volume data storage unit **93**. The storage unit **93** may be an optical memory or any other available large volume nonvolatile computer memory that provides both read and write access.

The central management system **11** communicates with each computer jukebox **13** via a transmission link **15**. The central management system **11** and each jukebox **13** use respective modems **17** and **19** to maintain serial communication on the transmission link **15**. The transmission link **15** may be a cable system such as public or private telephone lines or the like. However, the modems **17** and **19** may be replaced with RF (radio frequency) transceivers and associated antennas. In the latter instance the transmission link **15** is an RF link.

Additionally, in another embodiment, an audio codec may be included as part of the central management system **11**. The audio codec receives analog audio input, converts it into digital bytes, and then compresses these bytes via known audio compression methods for economic transmission, such as by the commercially available "MUSICAM.RTM." algorithm. The compressed digital audio can than be transmitted to the jukebox **13** by the transmission link **15** which, in addition to the above described system such as telephone lines, cable, RF links or modems, can include transmission via a sub carrier to utilize certain FM channels. In this embodiment, the audio information is transmitted in packets of a predetermined length. Each packet is organized such that a header is transmitted first. The header is followed by the compressed audio data and then by a trailer containing an error detection method to ensure that the audio was transferred properly.

In another embodiment, the central management system **11** transmits the compressed audio data via satellite or cellular telephone systems. In either of these cases, the transmission link **15** is a satellite uplink or a cellular uplink. In yet another embodiment, the audio information may be stored on a portable infra red device, and the information may be transmitted from the device via infra red rays to the computer jukebox **13**. As discussed in more detail below, the central management system **11** can transmit other information, specifically video and graphic information via the transmission link **15** to the computer jukebox **13**.

Specifically, the central management system **11** includes a host computer **21** which maintains a master library **23** of songs and associated graphics which are stored in a compressed digital form in a bulk storage unit **25**. The bulk storage unit **25** is capable of storing vast amounts of digital data, and may take the form of a read-write optical storage device. The host computer **21** indexes the master library **23** by using a master catalog **27** which is also maintained in the bulk storage unit **25**.

The master catalog **27** stores a song record **29**, as illustrated in FIG. **2**, for each song stored in the master library **23**. Each song record **29** associates information in the following fields: a) title field **31**, containing the name of the song; b) a classification field **33**, containing the type of music, i.e., country, pop, jazz, classical, etc.; c) a song address field **37**, containing the beginning address in the bulk storage unit **25** of the compressed digital data of the song; d) a song size field **39**, containing the number of bytes in length of the compressed digital data; e) a graphics address field **41**, containing the beginning address in the bulk storage unit **25** of the compressed digital data of a graphics image, if any, to be associated with the song; f) a graphics size field **43**, containing the number of bytes in length of the compressed graphics image; and g) a play count field **45**, containing a count which indicates the number of times this specific song has been played. By parsing the master catalog **27**, the host computer **21** can quickly locate all available information relating to any available song. The master catalog **27** also stores data particular to each jukebox such as the number of times each available song has been played, the coin intake for that jukebox, etc. The data particular to each jukebox is uploaded from the jukebox to the central management system **11** to update the master catalog **27**.

Returning to FIG. **1**, in order to add to the master library **23** and associated master catalog **27**, the host computer **21** receives, has compressed and stores in the bulk storage unit **25** digital data representing the new song and associated pictorial graphics. The host computer **21** receives the digital data for storage from three sources: 1) a compact disc read only memory (CDROM) reader **51**, which reads CDROMS; 2) a graphics scanner **53**, which digitizes pictorial graphic images; and 3) an analog to digital (A/D) reader/converter **55**, which reads analog data from both tapes and records and then converts the analog data into digital data. A compression circuit **52** using an adaptive-delta, pulse-code-modulation compression scheme compresses the digital data before it is stored. Other compression schemes may also be used. The compression circuit **52** might also be fully replaced by a software algorithm, such as MUSICAM.RTM., which is executed by the host computer **21**.

FIG. 3 more specifically illustrates the operation of the host computer **21** in adding new songs to the master library **23**. At a block **61**, the user is initially prompted by the host computer **21** to enter a new song title and category. The host computer **21** writes this information into the title field **31** and classification field **33** of a new song record **29** at a block **63**. Next, at a block **65**, the host computer **21** prompts the user to place either a CDROM into the reader **51** or a record or tape into the reader/converter **55**. After the user has completed this placement, at a block **67** the host computer **21** identifies available storage space in the bulk storage unit **25** by analyzing the space in use as described in the current list of song records **29** in the master catalog **27**. The beginning address of this available storage space is placed in the song address field **37** of the new song record **29**. Thereafter, at a block **69**, the host computer **21** provides a read enable signal on a bus **50** to either the reader **51** or reader/converter **55**. Either the reader **51** or reader/converter **55** responds by reading and sending digital data representing the new song to the host computer **21** via the bus **50**. Utilizing a bus **54**, the host computer **21** forwards the digital data received to the compression circuit **52**, receives compressed digital data from the compression circuit **52** and writes the compressed digital data into the bulk storage unit **25**. At a block **71**, upon reaching the end of the digital data output, i.e., the end of a song, the host computer **21** writes the byte length of the digital output into the song size field **39**.

The host computer **21** at a block **73** prompts the user to load a picture, such as an album cover, into the graphics scanner **53**. At a block **75**, the host computer **21** identifies further available storage space in the bulk storage unit **25** and places the beginning address thereof into the graphics address field **41**. Once a picture is loaded, the host computer **21** at block **77**, using the bus **50**, provides a read enable signal to the scanner **53** which responds via bus **50** by digitizing the picture and transferring the digitized output to the host computer **21**. At a block **79**, using the bus **54**, the host computer **21** forwards the digitized data of the picture to the compression circuit **52**, receives compressed digitized data from the compression circuit **52**, and writes the compressed digitized data into the bulk storage unit **25**. At a block **81**, upon reaching the end of the digitized output, i.e., the end of the picture, the host computer **21** places the byte length of the digitized output into the graphics size field **43**. Finally, at a block **83**, the host computer **21** sets the play count field **45** to zero (0). This flow-chart is repeated as necessary until all of the new songs are added to the master library **27**. It is noted that the operator can also delete, modify or replace any specific song record **29** found in the master catalog **27** and master library **23**.

Returning to FIG. **1**, each computer jukebox **13** plays songs and displays graphics which are stored locally in the large-volume data storage unit **93**. The storage unit **93** of the jukebox **13** contains a subset of the songs found in the master library **23** maintained by the central management system **11**. More specifically, the storage unit **93** of the jukebox **13** stores a song library **91** which is a corresponding subset of the master library **23**. The song library **91** contains all of the currently available song selections and associated pictorial graphics for the jukebox **13**. The storage unit **93** also stores a catalog **95** that is an index into the local song library **91**. The catalog **95** is similar to the master catalog **27**. Both the song library **91** and associated catalog **95** are monitored and updated by the central management system **11** as needed via the transmission link **15**. The jukebox **13** permits this monitoring and updating at any time with no impact on its end-user performance.

The jukebox **13** also includes a processing circuit **121** which contains a microprocessor **121A**, read only memory (ROM) **121B** and random access memory (RAM) **121C**. As in conventional computer systems, the microprocessor **121A** operates in accordance with the software program contained in the ROM **121B** and utilizes the RAM **121C** for scratch-pad memory. The processing circuit **121** may also contain a decompression circuit (not shown) or may perform decompression using a software algorithm stored in the ROM **121B** depending on the type of data compression scheme used by the central management system **11**. In either case, decompression is necessary to decompress the compressed data received from the central control system **11** so that the song can be played and associated graphics image displayed.

The processing circuit **121** controls the operation and flow of data into and out of the jukebox **13** through the modem **19** via a bus **124**. Using the bus **124**, the processing circuit **121** also controls a visual display **125**, one or more selection keys **123** and a coin/bill detector **126** to provide the user with an interactive interface to the jukebox **13**. The keys **123** provide signals representing user inputs such as displayed song selection. The display **125** displays alpha numeric information as well as pictorial graphics to interface with the user. The coin/bill detector **126** is responsive to one or more coins or bills input by a customer to determine whether the proper amount of money has been input and to provide money detect signals coupled to the processing circuit. The processing circuit **121** further controls, via the bus **124**, an audio reproduction circuit **127** coupled to a speaker system **129** along a bus **131** to provide an audio output to the user.

FIGS. **4A** and **4B** are flow-charts illustrating the software procedures respectively used by the central management system **11** and the jukebox **13** in managing the song library **91** of the jukebox **13**. At a block **101**, the central management system **11** initiates communication with one of the jukeboxes **13** via the transmission link **15**.

Immediately thereafter, at a block **103**, the management system **11** requests that the jukebox data be sent including a copy of the catalog **95**. At a corresponding block **141**, the jukebox **13** responds by sending the copy of the catalog file as well as other jukebox data including total money intake over a period of time. The data sent from the jukebox to the management station may also include customer requests for new songs, a customer utilizing the display and keyboard of the jukebox **13** to enter song request data as discussed below. Thereafter, at a block **105**, by examining each play count field **45** in the copy of the catalog **95** received, the management system **11** determines the royalty amount due per song and whether to replace or update specific song entries stored in the jukebox **13**. The management system **11** also determines the total money intake from the play count information and compares this value to the total money intake value received from the jukebox to provide a check. At an inquiry block **107**, if no replacements are necessary, the management system **11** branches to a block **109** to terminate communication with the jukebox **13**. If, however, replacements are necessary, the management system **11** branches to download the changes. Particularly, at a block **111**, the management system **11** downloads to the jukebox **13** the song records **29** of both the song to be replaced and the replacement song. In a corresponding block **143**, the jukebox **13** replaces the song record **29** in the catalog **95**.

Thereafter, the jukebox **13** identifies available storage space in the storage unit **93** based on the song size field **39** of the new song, and writes the beginning address thereof into the song address field **37** in a corresponding block **145**. Afterwards, at a block **113**, the central management system

11 downloads the compressed digital data of the song to the jukebox 13. Afterwards, at a block 113 the central management system 11 downloads the compressed digital data of the song to the jukebox 13. At a corresponding block 147, the jukebox 13 receives and writes the data into the song library 91. Next, at a corresponding block 149, the jukebox 13 identifies available storage space in the storage unit 93 based on the graphics size field 43, and writes the beginning address thereof into the graphics address field 41 of the new song. Thereafter, at a block 115, the management system 11 downloads the compressed digitized data of the picture to the jukebox 13. The jukebox, at a corresponding block 151, receives and writes the data into the song library 91. Finally, the block 107 is again encountered. If further replacements need to be made, the blocks 111, 113 and 115 are repeated until complete. At a corresponding block 153, the jukebox similarly repeats the corresponding blocks 143 through 151 until no further replacements need to be made. A further block placed immediately above the block 107 may also be used, wherein the central management system 11 sends a delete, modify, add or replace command to the jukebox 13 before downloading into the song library 93. In this way, the management system 11 receives additional flexibility in updating the jukebox 13. It is noted that the jukebox 13 can also initiate communications with the management system 11 at predetermined times or if the jukebox determines that an event has occurred that the management system 11 should be aware of.

FIG. 5 is a flow-chart illustrating the specific operation of the processing circuit 121 of the jukebox 13 in interfacing with the user. At a block 161, if no song selection is playing, the processing circuit 121 operates in a user attract mode, displaying a random sequence of available graphic images on the visual display 125. More particularly, the processing circuit 121 randomly selects a starting address of the compressed graphics data from the available song records 29 in the catalog 95. From that starting address, the circuit 121 retrieves the data from the song library 91 via the bus 124. The circuit 121 decompresses and transfers the data along the bus 124 to the visual display 125 for display. Thereafter, the circuit 121 again randomly selects a starting address of available graphics data and this cycle repeats. If, however, a song selection is being played when the block 161 is encountered, the attract mode sequencing does not occur. Instead, the circuit 121 displays the associated graphics image of the song being played on the display 125. During the attract mode the processing circuit 121 may also control the display 125 to present a prompt requesting customers to enter new song requests. The new song request data entered by a customer using the keyboard is stored and uploaded to the management system 11 to aid the system 11 in determining whether new song data should be downloaded to the jukebox.

At a block 163, the processing circuit 121 responds to a signal indicating user interest from the selection keys 123 by providing on the display 125 those music categories, i.e., country, rock, jazz, etc., found in the catalog 95. At a block 165, the circuit 121 responds to a signal indicating a category selection from the keys 123 by providing on the display 125 an index of available songs, arranged alphabetically either by artist or title, which can be scrolled and selected using the keys 123. Upon selection of a specific song, the circuit 121 encounters an inquiry block 167. If at the block 167 the circuit 121 determines from the signal received from the money detector 125 that a sufficient amount of money has not been deposited, a branch to a block 169 occurs. At the block 169, using the display 125, the circuit 121 prompts the user to deposit money into the coin/bill detector 126, then branches back to the block 161. However, if sufficient moneys have been deposited, the circuit 121 branches to a block 171 wherein the circuit 121 updates the play count field of the selected song's record in the catalog file 95 and money intake data stored in the memory. The circuit also places the song record 29 corresponding to the selected song into a queue of song records to be played. After the selection is queued, the circuit 121 encounters an inquiry block 153. If the total number of selections purchased have been selected, the circuit 121 branches back to the block 161. Otherwise, if further purchased selections are forthcoming, the circuit 121 branches back to the block 163., In this manner, all of the selections are made and placed in the queue. Upon completion of playing a queued-up, selected song, the circuit 121 removes the corresponding song record 29 from the queue, selects the next song record in the queue, begins to play that next song, and executes the block 161. It is noted that the song queue can be displayed on the display 125 in order to show customers what songs have already been selected prior to making their selection.

More specifically, referring back to FIG. 1, once a specific song has been selected and queued-up, the processing circuit 121 first identifies the beginning address of the compressed digital data from the song address field 37 of the song record 29 in the queue. From this address, using the bus 124, the circuit 121 reads the compressed digital data out of the storage unit 93, decompresses that data, and sends the decompressed digital data to the audio reproduction circuit 127. The audio reproduction circuit 127, commonly found in CDROM readers and associated amplifiers, converts the digital data to an analog signal which is amplified and used to drive the speaker system 129 via the bus 131. After a selected song finishes playing, the processing circuit 121 deletes the song record 29 of the selected song from the queue, increments the play count field 45 associated with that song in the catalog 95, and begins playing the next selected song in the queue if any exists. The process set forth in the flow-chart detailed in FIG. 5 is then repeated.

While the present invention is being described and illustrated in accordance with the preferred embodiment enabling new recordings and computer usage data to be transferred via the transmission line 15, the monitoring and updating may also be directly transferred. In this latter embodiment, routemen physically visit the location of each computer jukebox 13. During these visits, the routemen carry a portable management system 181 which has only a subset of potential replacement songs stored in a subset library and associated catalog (not shown) on a portable bulk storage unit 183. The subset library is loaded by the portable management system 181 onto the portable bulk storage unit 183 either directly from the bulk storage unit 25 or indirectly as is initially done by the central management system 11 (described above). In all other ways, the portable management system 181 operates the same as the central management system 11, collecting the catalog 95 of each jukebox 13 and updating or replacing as necessary. To accomplish this, the portable management system 181 communicates at a very high rate of speed with the jukebox 13 via a parallel communication link 185 and a direct memory access (DMA) link 187.

Additionally, the routemen may simply exchange the "old" storage unit 93 with a pre-loaded storage unit (not shown). The central management system 11 may later read the "old" storage unit 93 to gather the information from the

catalog **95**. Such an embodiment still enjoys the other advantages made possible by the computer jukeboxes **13** described herein.

Additionally, the visual display **125** can be directed to display various advertisements. The advertisements are downloaded from the central management system **11** to selected computer jukeboxes **13** via the transmission link **15**. Also downloaded with the advertisements is digital data representing the identity of each advertisement, the number of times, and when each of the advertisements is to be run. The advertisement data is stored at a separate location on the storage unit **93** so that they can be easily located and tracked.

The advertisements like the audio data are preferably sent to the computer jukebox **13** in compressed form, using a known compression scheme. The compressed data is preferably sent in packets that contain a header. The header contains information about the advertisement including how many times a day the advertisement should be run and at what times. The advertisements can then be displayed at the predetermined times on the visual display **125**.

In the preferred embodiment, if a conflict arises between a song being played and the time for an advertisement to be played, the conflict is resolved as follows. If the song contains audio only and no associated graphics being shown on the visual display **125**, then the advertisement, if it is video only, will be played simultaneously. If the advertisement contains video data and audio data, the advertisement will be run at the next available time slot or be shipped altogether. As each jukebox **13** tracks when an advertisement starts and when it stops, if a particular advertisement is never run, then the central management system will receive such information and the advertiser will be billed accordingly.

The advertisements are also stored in the storage unit **93**. Because there is bilateral communication between the central management system **11** and the computer jukeboxes **13**, the central management system **11** can track the number of times each advertisement is actually run for billing and royalty purposes by having this information uploaded from the computer jukebox **13** to the central management system **11**. The transmission link **15** that's used to download or transmit these advertisements can be any of the means disclosed above, including, modems **17**, **19**, a cable system, a RF link, a satellite link, a cellular telephone link, or a portable handheld device.

The downloading and storing of advertisements is completed by the same apparatus and method as described above in connection with FIGS. **1** through **5**.

In yet another embodiment, the computer jukebox **13** is associated with an electronic game, such as an electronic dart game. In the embodiment, the advertisements are also played on the visual display **125** associated with the electronic game when the game is not being played.

Additionally, it is to be understood that the embodiments of the present invention described hereinabove are merely illustrative and that other modifications and adaptations may be made without departing from the scope of the appended claims.

What is claimed is:

1. A computer jukebox receiving and storing digital advertisement data representing a plurality of advertisements from a remote source, data representing the identity of each of said advertisements, and data representing when and the number of times each of said advertisements is to be run, comprising:

a display associated with said jukebox, said display allowing a user to retrieve and play a signal representing a song selected from a plurality of songs stored in said jukebox;

a communication interface receiving said advertisement data from the remote source, said data including (i) the identity of each of said advertisements, (ii) when and the number of times each of said advertisements to be run, said computer jukebox downloading said advertisement data from a transmission link that allows bi-directional communication between a remote central management system and said communication interface of said computer jukebox;

a programmable computer memory storing said digital advertisement data; and

a processor displaying one of said plurality of advertisements on said display when said jukebox is not generating a signal representing a song selected from said plurality of songs stored in said jukebox, wherein said processor is responsive to said data representing when and the number of times each of said advertisements is to be run.

2. The computer jukebox of claim **1**, wherein said communication interface includes at least one of a modem, a radio frequency receiver, a direct interface port, a portable infra red device, a satellite receiver, and cellular telephone receiver.

3. A computer jukebox network comprising:

song data representing a plurality of songs;

advertisement data representing at least one advertisement;

a central management system including a host computer and a programmable memory storing said song data representing the plurality of songs, said programmable memory also storing said advertisement data representing the at least one advertisement;

a computer jukebox remotely located from said central management system, said computer jukebox including a processor and a data storage unit, said data storage unit having a song storage location storing song data and an advertisement storage location receiving advertisement data, wherein said processor runs said at least one advertisement represented by said advertisement data downloaded from said central management system when said computer jukebox is not generating a signal representing a song selected from a plurality of songs within said song data stored in said song storage location; and

a transmission link allowing bi-directional communication between said central management system and said computer jukebox, said computer jukebox downloading said song data from said central management system by way of said transmission link and storing said song data in said song storage location of said data storage unit, said computer jukebox downloading said advertisement data from said central management system by way of said transmission link and storing said advertisement data in said advertisement storage location of said data storage unit.

4. The computer jukebox network of claim **3**, wherein said processor runs said at least one advertisement downloaded as advertisement data from said central management system on a visual display.

5. The computer jukebox network of claim **3**, wherein said central management system uploads information from said computer jukebox by way of said transmission link, wherein

said information includes the number of times said at least one advertisement is run by said computer jukebox.

6. The computer jukebox network of claim 3, wherein at least one of said central processor and said jukebox processor tracks the number of times said at least one advertisement is run by said computer jukebox.

7. The computer jukebox network of claim 3, wherein said advertisement data comprises digital data representing an identity of said at least one advertisement, and a number of times and when said at least one advertisement is to be run by said computer jukebox.

8. The computer jukebox network of claim 3, further comprising an electronic game having a visual display, wherein said electronic game is associated with said computer jukebox, and wherein said at least one advertisement is displayed on said visual display.

9. The computer jukebox network of claim 3, wherein said processor presents user attract data on a display, wherein said user attract data is based on a song stored within said song data in said song storage location of said data storage unit.

10. A computer jukebox receiving and storing advertisement data representing at least one advertisement from a remote central management system by way of a transmission link between, the computer jukebox and the central management system, said computer jukebox comprising:

advertisement data;

a communication interface receiving said advertisement data from the remote central management system by way of the transmission link;

a programmable memory storing said advertisement data; and

a processor running said at least one advertisement according to said advertisement data, wherein said advertisement data includes an identity of at least one advertisement, and wherein said advertisement data includes at least one time for said at least one advertisement to be run by said computer jukebox, wherein said processor runs said at least one advertisement according to said advertisement data when said jukebox is not generating a signal representing a song selected from a plurality of songs stored in said jukebox.

11. The computer jukebox of claim 10, further comprising a visual display, wherein said processor runs said at least one advertisement on said visual display.

12. The computer jukebox of claim 10, wherein said programmable memory includes a song storage unit for storing song data and an advertisement storage unit for storing said advertisement data downloaded from the central management system.

13. The computer jukebox of claim 10, wherein said computer jukebox communicates bi-directionally with the central management system by way of the transmission link.

14. The computer jukebox of claim 10, wherein the central management system uploads information from said computer jukebox, wherein said information includes the number of times each of the plurality of advertisements is run by said computer jukebox.

15. The computer jukebox of claim 10, wherein said processor tracks the number of times said at least one advertisement is run by said computer jukebox.

16. The computer jukebox of claim 10, further comprising an electronic game having a visual display, wherein said electronic game is associated with said computer jukebox, and wherein said at least one advertisement is displayed on said visual display.

17. The computer jukebox of claim 10, wherein said processor presents user attract data on a display, wherein said user attract data is based on a song being played by said computer jukebox.

* * * * *

EXHIBIT G

US006598230B1

(12) **United States Patent**
Ballhorn

(10) **Patent No.: US 6,598,230 B1**
(45) **Date of Patent: Jul. 22, 2003**

(54) **MULTIMEDIA BOX NETWORK**

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Oct. 15, 1998 (DE) 198 47 686

(51) **Int. Cl.**[7] **H04N 7/173**; G06F 15/16

(52) **U.S. Cl.** ..... **725/118**; 725/119; 725/98; 725/110; 709/217; 434/307 A

(58) **Field of Search** ..... 725/98, 114–119, 725/110, 109, 111, 113, 122, 9–93; 709/217–219, 223 232; 434/307 A; 455/414, 420, 557, 3.01, 3.03, 3.06

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DE	196 14 820	10/1997
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(74) *Attorney, Agent, or Firm*—Patents & Tms, P.C.

(57) **ABSTRACT**

The invention relates to a multimedia box network consisting of a data server comprising a mass storage device, on which digital pieces of music and/or videos are stored, and of a plurality of multimedia boxes, with one multimedia box in each case comprising an operating unit, a local storage device and a player unit, and with each multimedia box being connected to the data server by means of a first data link. To provide a high-performance network for multimedia boxes, which allows a decentralised servicing of the multimedia boxes, it is provided that at least one management station comprising a computer is connected to the data server by means of a second data link and to at least one multimedia box by means of a third data link.

18 Claims, 3 Drawing Sheets

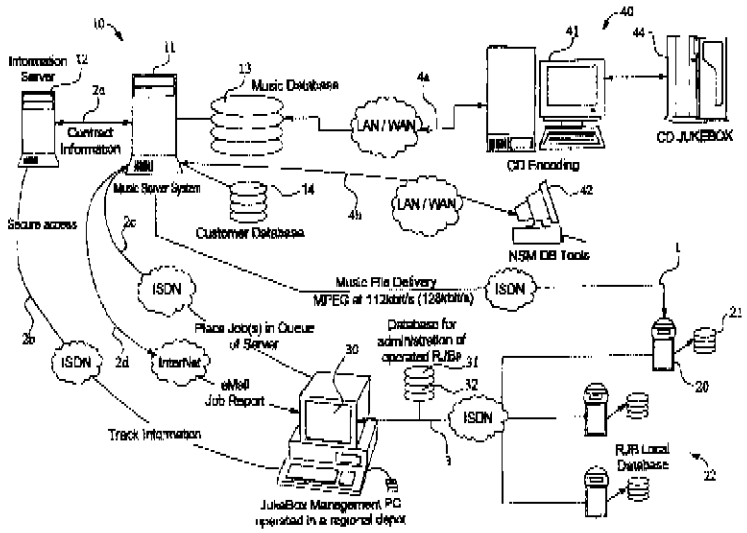


FIG. 1

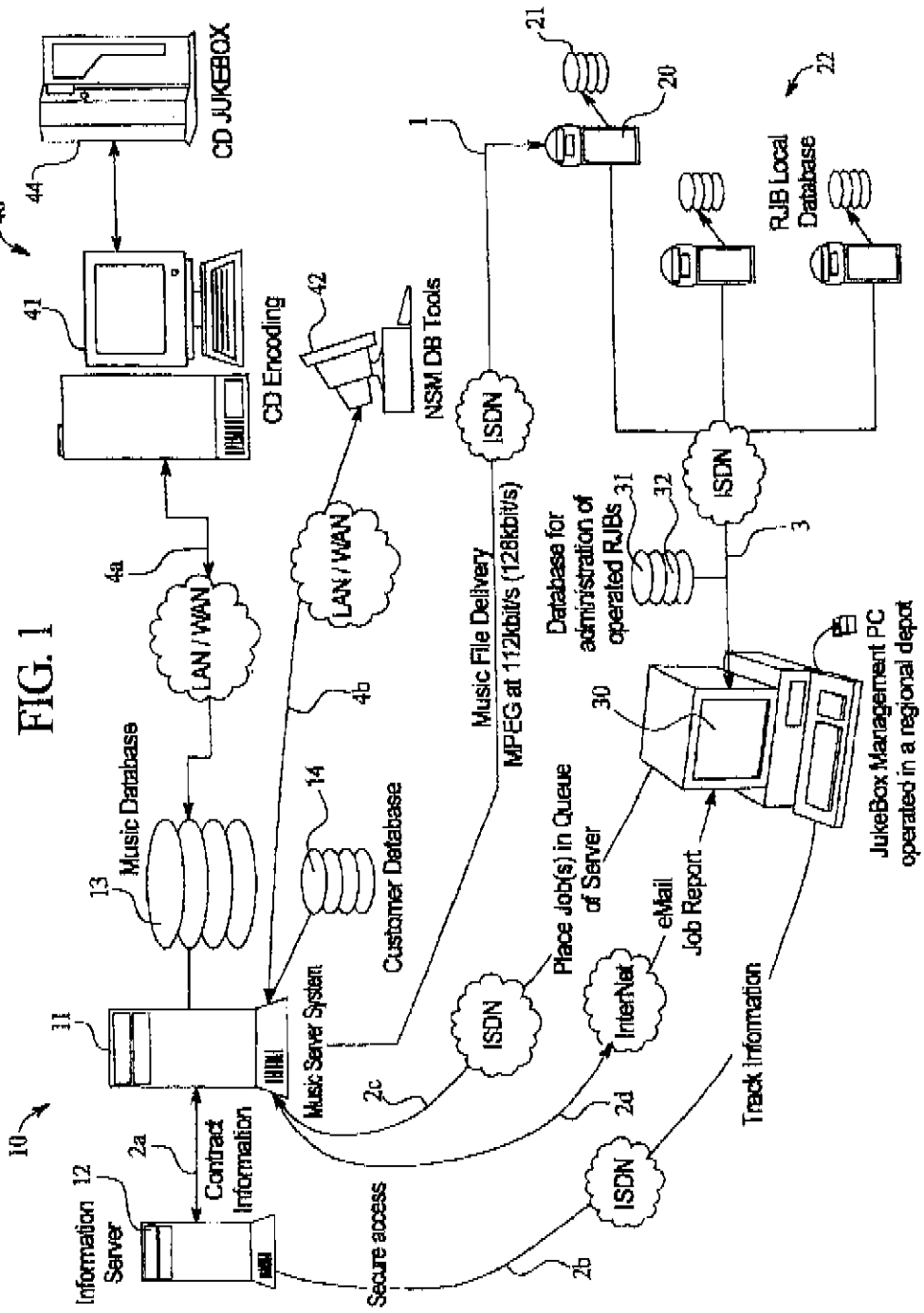

CD JUKEBOX
44
40
41
CD Encoding
42
NSM DB Tools
1
21
20
22
RJB Local Database
ISDN
4a
LAN / WAN
LAN / WAN
4b
Music File Delivery
MPEG at 112kbit/s (128kbit/s)
Database for administration of operated RJBs
31
32
3
ISDN
Music Database
13
14
Customer Database
30
JukeBox Management PC operated in a regional depot
Place Job(s) in Queue of Server
eMail Job Report
Track Information
ISDN
InterNet
31
Music Server System
2c
2d
10
2a
Contract Information
12
Information Server
Secure access
ISDN
2b

FIG. 2

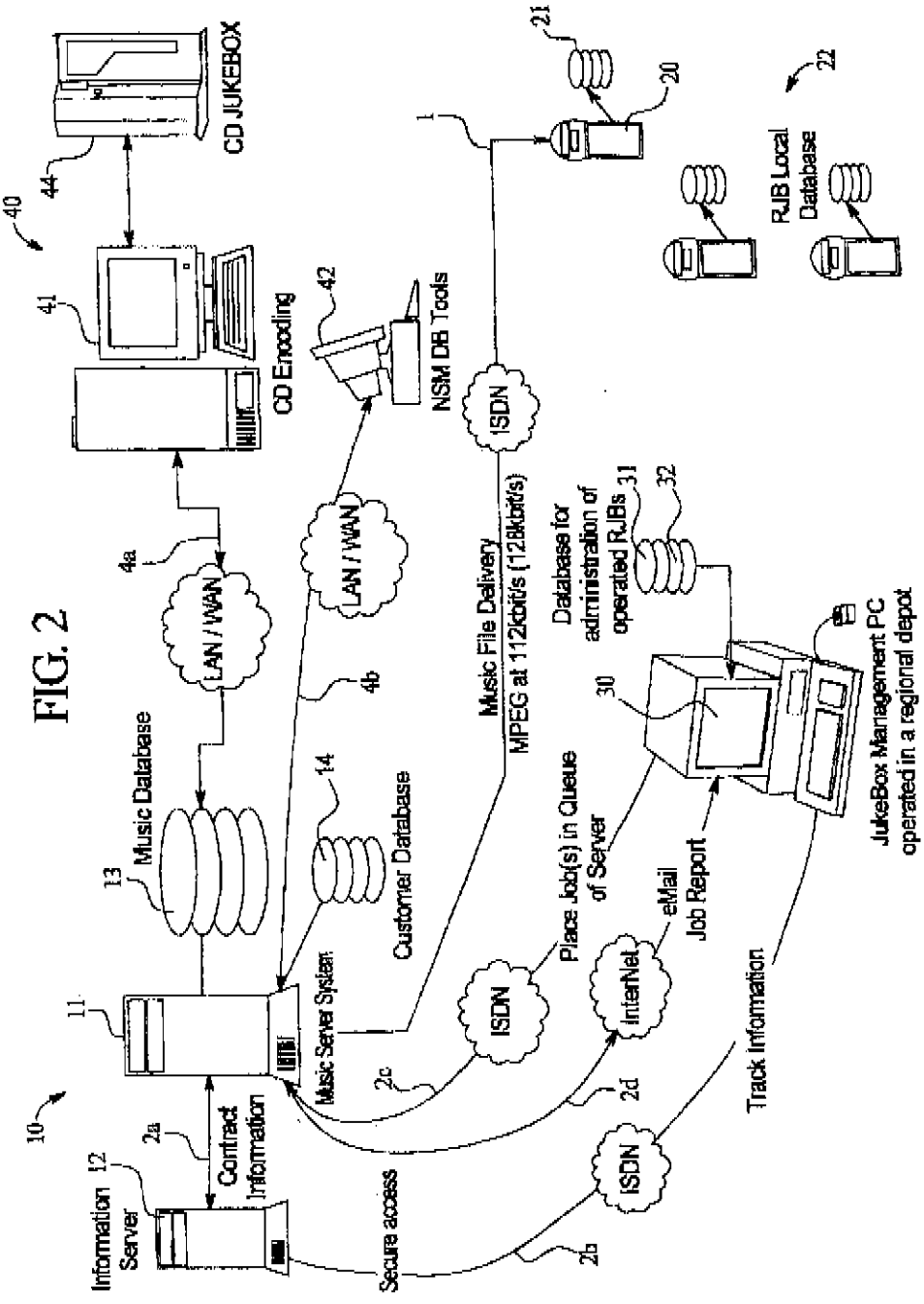
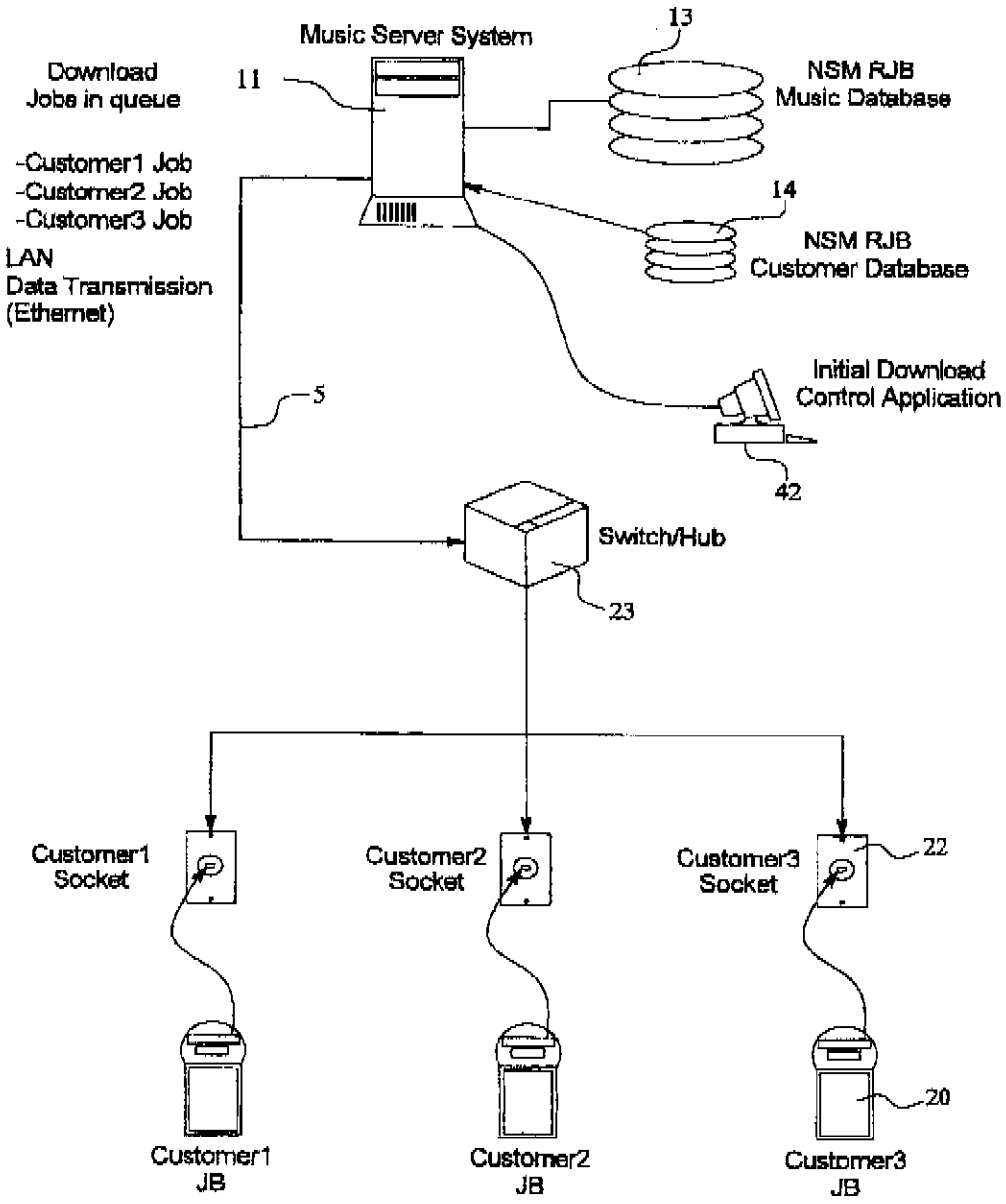

CD JUKEBOX
44
40
41
CD Encoding
42
NSM DB Tools
ISDN
1
21
20
22
RJB Local Database
4a
LAN / WAN
LAN / WAN
4b
Music File Delivery
MPEG at 112kbit/s (128kbit/s)
Database for administration of operated RJBs
31
32
30
JukeBox Management PC operated in a regional depot
13
Music Database
14
Customer Database
Place Job(s) in Queue of Server
eMail
Job Report
11
Music Server System
ISDN
InterNet
2c
2d
Track Information
10
2a
Contract Information
12
Information Server
Secure access
ISDN
2b

FIG. 3


Music Server System
13
Download
Jobs in queue
11
NSM RJB
Music Database
-Customer1 Job
-Customer2 Job
-Customer3 Job
14
NSM RJB
Customer Database
LAN
Data Transmission
(Ethernet)
Initial Download
Control Application
5
42
Switch/Hub
23
Customer1
Socket
Customer2
Socket
Customer3
Socket
22
20
Customer1
JB
Customer2
JB
Customer3
JB

MULTIMEDIA BOX NETWORK

BACKGROUND OF THE INVENTION

1. Field of the Invention

The invention relates to a multimedia box network consisting of a data server comprising a mass storage means on which digital pieces of music and/or videos are stored and of a plurality of multimedia boxes, with each multimedia box comprising an operating apparatus, a local storage means and a player apparatus and with each multimedia box being connected to the data server by means of a first data link.

2. Description of the Related Art

Such a network is known, for example, from WO 92/01342. In accordance with WO 92/01342, a plurality of automatic jukeboxes are each linked to a central music storage means by means of a remote data transmission line, with said remote data transmission line preferably being an ISDN line. The automatic jukebox possesses in a known manner a coin acceptance device, a display, an input keypad and at least one loudspeaker and further possesses a digital to analog converter and amplifier for sound data recorded via the remote data transmission line.

From DE 42 44 198 A1, a network for a plurality of jukeboxes is known, said network having a decentralised structure. Here, no central storage device is provided for the pieces of music which can be played, but rather the pieces of music to be stored are distributed over a certain number of music player apparatus. The music player apparatuses are linked to one another in a network so that a piece of music can be requested from each music player unit to any other music player unit. A central computer additionally performs central management jobs, with, in particular, utilisation data of the individual music player apparatuses being stored on the central computer.

From U.S. Pat. No. 5,355,302, a network is known consisting of multiple jukeboxes, in which the individual jukeboxes are linked to a central management station in a star-shaped structure. The management station comprises a host computer and a mass storage device so that music data can be transmitted to the individual jukeboxes by the management station. In addition, the management station also takes over management jobs. For the servicing of the individual jukeboxes, a portable console is provided in each case which can be hooked up to the corresponding jukebox on site.

One disadvantage of the networks for jukeboxes described above is that either only central servicing by means of a central computer or, however, servicing on site for an individual jukebox is possible.

SUMMARY OF THE INVENTION.

It is therefore the object of this invention to provide a high-performance network for multimedia boxes which allows a decentralised servicing of a plurality of multimedia boxes.

This object is obtained with the present invention which includes at least one management station comprising a computer being linked by means of a second data link to the data server and by means of a third data link to at least one multimedia box, with pieces of music and/or videos being able to be transmitted from the data server to the multimedia box via the first data link, with data on the pieces of music and/or videos available on the data server being able to be transmitted via the second data link and with data for the servicing and/or programming of the individual jukeboxes being able to be transmitted from the management station connected thereto via the third data link. In accordance with the invention, a management station is therefore provided in each case for a certain group of a plurality of multimedia boxes, such management station allowing a decentralised servicing of said multimedia boxes. The management station does not here take over the job of transmitting large volumes of data, but merely regulates the exchange of information between the data server and the individual multimedia boxes while taking into account the range of pieces of music and/or videos provided in each case for a multimedia box.

With the multimedia box network in accordance with the invention, it is thus possible to service and manage a plurality of multimedia boxes in a decentralised manner by one operator or one operating company. The operating company can, in turn, forward the programme range for a multimedia box or the service for the maintenance of the multimedia box to the end user in each case. In this way, a decentralised system is provided for the operation of a plurality of multimedia boxes which are, in turn, linked to a data server in a cost-favourable manner.

In accordance with a preferred embodiment, the first data link between the data server and a multimedia box consists of an ISDN line.

In accordance with a preferred embodiment, it is provided that a service database of the pieces of music and/or videos available on the data server is stored on the management station, with said service database being able to be updated via the second data link. Even in the case of a large volume of data of stored pieces of music and/or videos on the data server, the compilation of the titles available in each case represents only a relatively low volume of data so that these can be stored without problem on the corresponding management stations in a database, too. As soon as certain services should be performed with a management station, first a connection is made to the central data server to update the service database of the corresponding management station. For this purpose, the data server transmits an add command to the management station for each new title to be added and a delete command for titles to be deleted.

To simplify the management of the pieces of music and/or videos available in each case on the data server, it can be provided that the data server consists of a main server and an information server. While the actual data of the pieces of music and/or videos are stored on the main server, the information server only manages the titles stored on the main server, in which way the main server is relieved. Appropriately, in this process all the data on the data programme of the main server is stored in an information database on the information server, with the exchange of data between the main server and the information server being made via a parallel data link. However, it is naturally also possible for the information server to be separated in space from the main server and for it to communicate with the main server via a suitable serial data link.

In accordance with another preferred embodiment, it is provided that a user database of the user data is stored on the management station, by means of which via the third data link a servicing and/or programming of the multimedia box connected in each case is possible. In this way, on the management station, the information on the multimedia box connected in each case is available directly without any additional data transmission being required for this purpose. In particular, the status of the multimedia boxes connected to the management station in each case can be stored on the

user database. With the management station, it is thus possible to modify on the multimedia box in each case certain graphics and presentation forms of the titles stored equally as, for example, billing procedures towards the operator of the management station in each case.

In accordance with another preferred embodiment, it is provided that a command to record pieces of music and/or videos onto a certain multimedia box can be sent by the management station connected thereto to the data server via the second data link and/or via an additional link, with the recording of pieces of music and/or videos on the certain multimedia box being performed via the first data link. As a result, on the basis of the information database, the titles to be newly recorded for a multimedia box are compiled on the management station and a corresponding command generated from this for the data server. This command is then sent to the data server. To the extent that on the part of the data server there is a separation between an information server and a main server, the sending of the command is preferably made directly via an additional data link to the main server. The additional data link here preferably consists of an ISDN line in the direction of the data server and of an Internet connection in the opposite direction to the management station. Via the ISDN line, the command can be sent fast and directly to the data server or the main server, while, as a rule, it is not necessary to wait for confirmation from the data server or the main server that the command has actually been performed. For this reason, it is meaningful to send the command confirmation of the data server or the main server via the Internet where the corresponding message can be stored as an e-mail and downloaded from the management station at a suitable opportunity.

With regard to the design of the third data link between the management station and a multimedia box, two possibilities exist: on the one hand, a direct data link consisting of an ISDN line can be set up between the management station and the multimedia box in each case. On the other hand, however, it is also feasible that the already existing data links in accordance with the first data link and the second data link can be utilised, by these being connected in series in a suitable manner. For example, it is feasible to use the additional data link to the main server described above to connect this to the ISDN line between the main server and a multimedia box. For this purpose, the main server receives a corresponding connection call from the management station and switches this through to the corresponding ISDN line. In a corresponding way, it is naturally also possible to utilise the ISDN line described above between the management station and the information server. A switching on to the first data link consisting of an ISDN line between the main server and a multimedia box is then performed via the parallel data link between the information server and the main server.

The recording of corresponding music data on the data server is performed preferably by means of a CD playing apparatus. However, it should be noted here that the data format of the music data stored on a CD is not suitable for transmission in large volumes of data. It is therefore appropriate to convert the music data stored on a CD into a suitable format for transmission, with, for example, the MPEG format being suitable for pieces of music or music data and the JPEG format for images. As part of the transmission of images, in particular cover images can also be transmitted, with, when a piece of music is being played by the multimedia box, an associated cover image being displayed.

In accordance with a preferred embodiment, it is provided that the operating unit of a multimedia box consists of a touch-screen monitor on which the digital pieces of music and/or videos stored in the local memory can be displayed and selected by finger pressure and forwarded to a player apparatus. The player apparatus here consists in a normal manner of an amplifier/loudspeaker apparatus for the playing of the pieces of music and, where required, of a video monitor to display cover images or to present video images.

BRIEF DESCRIPTION OF THE DRAWINGS.

Further details and advantages of the invention are explained in more detail by means of an embodiment shown in the drawing, in which:

FIG. **1** shows the multimedia box network in accordance with the invention in operation in a first embodiment;

FIG. **2** shows the multimedia box network in accordance with the invention in operation in a second embodiment;

FIG. **3** shows the initialisation of individual multimedia boxes prior to their being put into operation.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Further scope of applicability of the present invention will become apparent from the detailed description given hereinafter. However, it should be understood that the detailed description and specific examples, while indicating preferred embodiments of the invention, are given by way of illustration only, since various changes and modifications within the spirit and scope of the invention will become apparent to those skilled in the art from this detailed description.

FIG. **1** shows the multimedia box network in accordance with the invention in a first embodiment.

The essential components of the multimedia box network are the data server **10**, the multimedia boxes **20** connected thereto in a star-shaped structure, the management station **30** and a CD player unit **40**. In the following, the network is described only for the transmission of music data, but the same also applies correspondingly to the transmission of other data in the multimedia area such as image data or video data. The data server **10** is, in turn, divided into a main server **11** and an information server **12**, which communicate with each other via a data link **2***a*. On the main server **11**, all music data and/or image data are stored in a database **13**, while data concerning billing and licensing are stored in a user database **14**. On the information server **12**, in contrast, all access data of the pieces of music available on the main server are stored. To record digital music data on the database **13**, a CD encoding system **41** with a CD changer **44** is provided. The CD encoding system converts the CD data format into a suitable transmission format, for example an MPEG format, so that the converted data can be transmitted to the music database **13** via a LAN/WAN data line **4***a*. To manage the user database **11**, in the CD player unit an additional operating unit **42** is provided which is connected to the main server **11** via the LAN/WAN data line **4***b*.

As a rule, only a data server **10** consisting of a main server and an information server **12** is required, with, for example, up to 10,000 pieces of music being able to be stored in MPEG format in the music database **13**. Then, the individual jukeboxes are connected in a star-shaped structure to the main server **10** via an ISDN line, with, for reasons of simplification, in FIG. **1** only one ISDN line **1** to one jukebox **20** being shown. A certain number of jukeboxes is operated and serviced by one operating company in each case so that these jukeboxes represent one operator group

22. Each operator group **22** has a management station **30** allocated to it, which is linked in each case via an ISDN line **3** in a star-shaped structure to the individual jukeboxes **20** of one operator group **22**. The management station **30** comprises a user database **31**, on which the status of the connected jukeboxes **20** is managed. On the side of the management station **30**, it is possible to modify on the jukebox **20** presentation types equally as certain billing procedures.

In addition to the user database **31**, the management station also comprises a service database **32** on which the pieces of music available on the data server are managed. To update the service database **32**, the management station **30** is linked to the information server **12** with an ISDN line **2***b*. In addition, there is in the direction of the main server **11** an ISDN link **2***c* and, in the opposite direction from the main server **11** to the management station **30** an Internet connection **2***d*.

In the operation of the network in accordance with FIG. **1**, a difference must essentially be made between the recording of new music data on the main server **11**, the recording of new music data on the jukeboxes **20** and the playing of pieces of music by the corresponding jukebox **20**.

The recording of new music data on the music server is performed via the CD player apparatus **40** via the LAN/WAN line **4***a* to the music database **13**. The music data are transmitted in the MPEG **1** layer **3** format so that per minute of playing time around 1 megabyte of memory is required. For the individual pieces of music, the licensing over the operating company of an operating group **22** is monitored in each case in the user database **14**. A piece of music can, for example, be licensed for one year so that after the year new license fees are incurred if the piece of music is still requested from the operating company.

The recording of new pieces of music to one music box **20** in each case is performed at the instigation of the operating company in the management station **30** in each case. The logging in on the part of the management station **30** on the data server **10** is performed in a first step via the ISDN line **2***b* over the information server **12**. After the log-in, the information server **12** transmits two command groups to update the service database **32**, namely an "add command" and a "delete command". The add command comprises a list of all music titles which were recorded by the CD player unit **40** after the last log-in. In contrast, the delete command contains a list of the music titles deleted from the music database **13** since the last log-in. After the log-in, the service database **32** thus represents a mirror image of the data on the music database **13** on the information server **12**.

After the up-dating of the service database **32** has been concluded, new music titles can be selected from the data programme by the operator which are to be newly recorded on a certain jukebox **20** of the operator group **22**. After the selection of the titles, a corresponding command is sent to the main server **11** via the ISDN line **2***c*. No further steps are required on the management station **30** so that the management station **30** can generally be switched out of the network after the sending of the command in question. The command received by the corresponding management station **30** is queued into a list of commands to be processed by the main server and processed at the appropriate time. For this purpose, the main server **11** makes a data link to the corresponding jukebox **20** via the ISDN line **1** and plays the selected music titles from the music database **13** into the local database **21** of the jukebox **20**. Once all music titles have been played over completely, the successful processing of the command is confirmed to the corresponding management station **30** via the Internet link **2***d*. The confirmation message is sent as an e-mail here and can be downloaded from the management station **30** at a convenient time.

FIG. **2** shows the multimedia box network in accordance with the invention in operation in a second embodiment.

The multimedia network of FIG. **2** differs from the network of FIG. **1** in that the third data link between the jukebox (**20**) in each case and the management station (**30**) does not consist of a direct ISDN link (**3**), but of an ISDN link led through the data server. Here, the already existing data links **2***b* or **2***c* and **2***a* and **1** are connected in series in such a way that a data link can be made between the jukebox in question and the management station.

FIG. **3** shows the initialisation of individual jukeboxes prior to their being put into operation.

A jukebox **20** is as a rule supplied with an empty local database **21** so that prior to its being put into operation the corresponding jukebox has to be initialised.

On the one hand, the initialisation of a jukebox can be performed after its installation on site so that then in accordance with FIG. **1** corresponding music data can be played over with an initialisation program available on the main server **11** via the ISDN line **1**. One disadvantage of this initialisation consists, however, of relatively high transmission costs being incurred through the ISDN line, as on the first recording of the local database **21** large volumes of data have to be transmitted.

Another possibility of initialisation therefore consists of the configuration of FIG. **2** where the jukeboxes **20** to be initialised are located in proximity to the main server **11** so that the corresponding data can be played over via a local network link **5**. In this way, data links with a transmission rate of some megabits per second can be made, while via the conventional ISDN line between the main server **11** and a jukebox **20** of FIG. **1**, transmission rates of only 128 Kbit per second can be achieved. After the jukeboxes **20** have been initialised accordingly, they can be supplied to the relevant operator, with the operator only having to connect the jukebox to a conventional ISDN phone socket at the installation location.

The invention being thus described, it will be apparent that the same may be varied in many ways. Such variations are not to be regarded as a departure from the spirit and scope of the invention, and all such modifications as would be recognized by one skilled in the art are intended to be included within the scope of the following claims.

What is claimed is:

1. A multimedia box network comprising:

a main data server including a mass storage device on which digital pieces of music and/or videos are stored;

an operator group including at least one multimedia box linked to said main data server by a first data link over which pieces of music and/or videos are transmitted, said at least one multimedia box including an operating unit, a local storage device and a player apparatus;

a peripheral management station connected to said main data server by a second data link over which said peripheral management station can receive data on the pieces of music and/or videos available on said main data server, said peripheral management station including a computer connected to said operator group by a third data link over which data for servicing and/or programming of said at least one multimedia box can be transferred from said peripheral management station.

2. The multimedia box network as set forth in claim 1, wherein said peripheral management station is remotely located from said operator group, and said third data link includes a direct ISDN line.

3. The multimedia box network as set forth in claim 1, wherein said third data link is connected in series with said first data link and said second data link.

4. The multimedia box network as set forth in claim 1, wherein said first data link includes an ISDN line.

5. The multimedia box network as set forth in claim 1, wherein said peripheral management station includes a service database for storing information on the pieces of music and/or videos available on said main data server, which stored information can be updated over said second data link.

6. The multimedia box network as set forth in claim 5, wherein said stored information is updated over said second data link using an add command and a delete command.

7. The multimedia box network as set forth in claim 1, wherein said main data server includes a separate information server storing information on a data program contained within said main data server, data between said main data server and said information server being exchanged via a parallel data link.

8. The multimedia box network as set forth in claim 1, wherein said operator group includes a plurality of multimedia boxes, said peripheral management station transferring data for servicing and/or programming of each of said plurality of multimedia boxes over said third data link.

9. The multimedia box network as set forth in claim 2, wherein said operator group includes a plurality of multimedia boxes, said peripheral management station transferring data for servicing and/or programming of each of said plurality of multimedia boxes over said third data link.

10. The multimedia box network as set forth in claim 5, wherein said peripheral data station provides said operator group with said data on the pieces of music and/or videos available on the main data server over said third data link, but said pieces of music and/or videos themselves are delivered to said operator group from said main data server over said first data link.

11. The multimedia box network as set forth in claim 1, further comprising a plurality of operator groups each including at least one multimedia box, each of said plurality of operator groups connected to a respective one of a plurality of peripheral management stations for decentralized servicing of said multimedia boxes through said respective peripheral management stations.

12. The multimedia box network as set forth in claim 1, wherein a command from said peripheral management station to play over specified pieces of music and/or videos onto said multimedia box connected thereto is sent to said main data server via said second data link, with actual playing over of said specified pieces of music and/or videos to said multimedia box being done via said first data link.

13. The multimedia box network as set forth in claim 12, wherein said second data link includes an ISDN line in a direction toward said main data server and an Internet connection in a direction toward said peripheral management station.

14. The multimedia box network as set forth in claim 9, wherein said peripheral management station includes a user database storing a status of each of said plurality of multimedia boxes connected to said peripheral management station.

15. The multimedia box network as set forth in claim 1, wherein said operating unit includes a touch-screen monitor for displaying identifying information on digital pieces of music and/or video stored in said local storage device, said touch-screen monitor allowing selection of a piece of music and/or video for forwarding to said player apparatus.

16. A multimedia box network comprising:

a main data server including a mass storage device on which digital pieces of music and/or videos are stored;

an operator group including at least one multimedia box remotely linked to said main data server by a first data link over which pieces of music and/or videos are transmitted, said at least one multimedia box including an operating unit, a local storage device and a player apparatus;

a peripheral management station connected to said main data server by a second data link, separate from said first data link, over which said peripheral management station can receive data on the pieces of music and/or videos available on said main data server, said peripheral management station remotely located from said main data server and from said operator group and including a computer connected to said operator group by a third data link, separate from said first and second data links, over which data for servicing and/or programming of said at least one multimedia box can be transferred from said remotely located peripheral management station.

17. The multimedia box network as set forth in claim 16, further comprising a plurality of operator groups each including at least one multimedia box, each of said plurality of operator groups connected to a respective one of a plurality of peripheral management stations for decentralized servicing of said multimedia boxes through said respective peripheral management stations.

18. The multimedia box network as set forth in claim 16, wherein said operator group includes a plurality of multimedia boxes serviced by said peripheral management station, said peripheral management station being operated in a regional depot.

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