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Eglen et al.

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(54) **DIGITAL ONLINE EXCHANGE FOR
PRICING ITEMS TO EXHAUST INVENTORY
BY AN EXPIRATION TIME**

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patent is extended or adjusted under 35
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application No. 11/422,546, filed on Jun. 6, 2006,
which is a continuation of application No. 10/084,777,
filed on Feb. 27, 2002, now Pat. No. 7,080,030.

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28, 2001, provisional application No. 60/310,381,
filed on Aug. 6, 2001.

(51) **Int. Cl.**
G06Q 99/00 (2006.01)

(52) **U.S. Cl.** **705/7.35**; 705/1.1; 705/14.27;
705/26.82; 705/400; 700/238

(58) **Field of Classification Search** 705/1, 37,
705/400, 1.1, 26, 35, 14, 14.27, 26.82, 7.35;
725/86; 700/238

See application file for complete search history.

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Primary Examiner — John Hayes

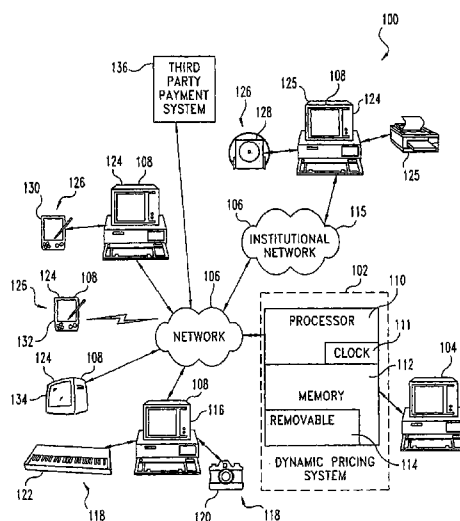
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(74) *Attorney, Agent, or Firm* — Ice Miller LLP

(57) **ABSTRACT**

A dynamic pricing system for pricing items for sale by a seller which items are available in a limited quantity comprises a pricing server and various types of data stored in memory. The pricing server includes memory, a processor and a clock. One type of data stored in memory is indicative of the initial quantity of an item available in a limited quantity. Another type of data stored in memory is indicative of the current remaining quantity of the item available in a limited quantity. Yet another type of data stored in memory is indicative of an expiration time at which it is desired that all of the item available in a limited quantity be sold. The processor is configured to price the item available in a limited quantity so as to deplete the inventory of the item available in a limited quantity by the expiration date based in part by accessing the memory to retrieve the data indicative of the initial quantity, the current remaining quantity and the expiration time and accessing the clock.

10 Claims, 37 Drawing Sheets



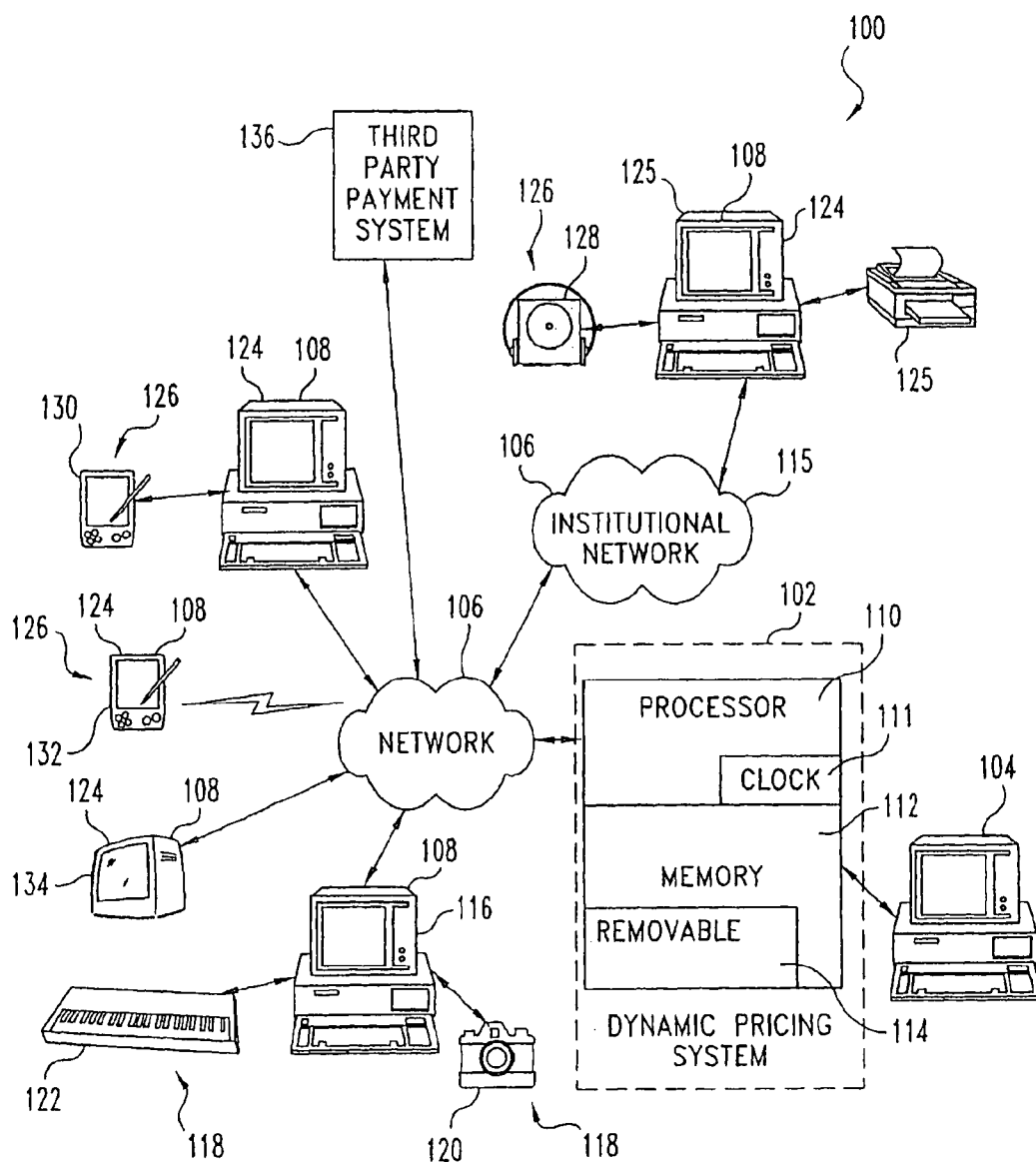
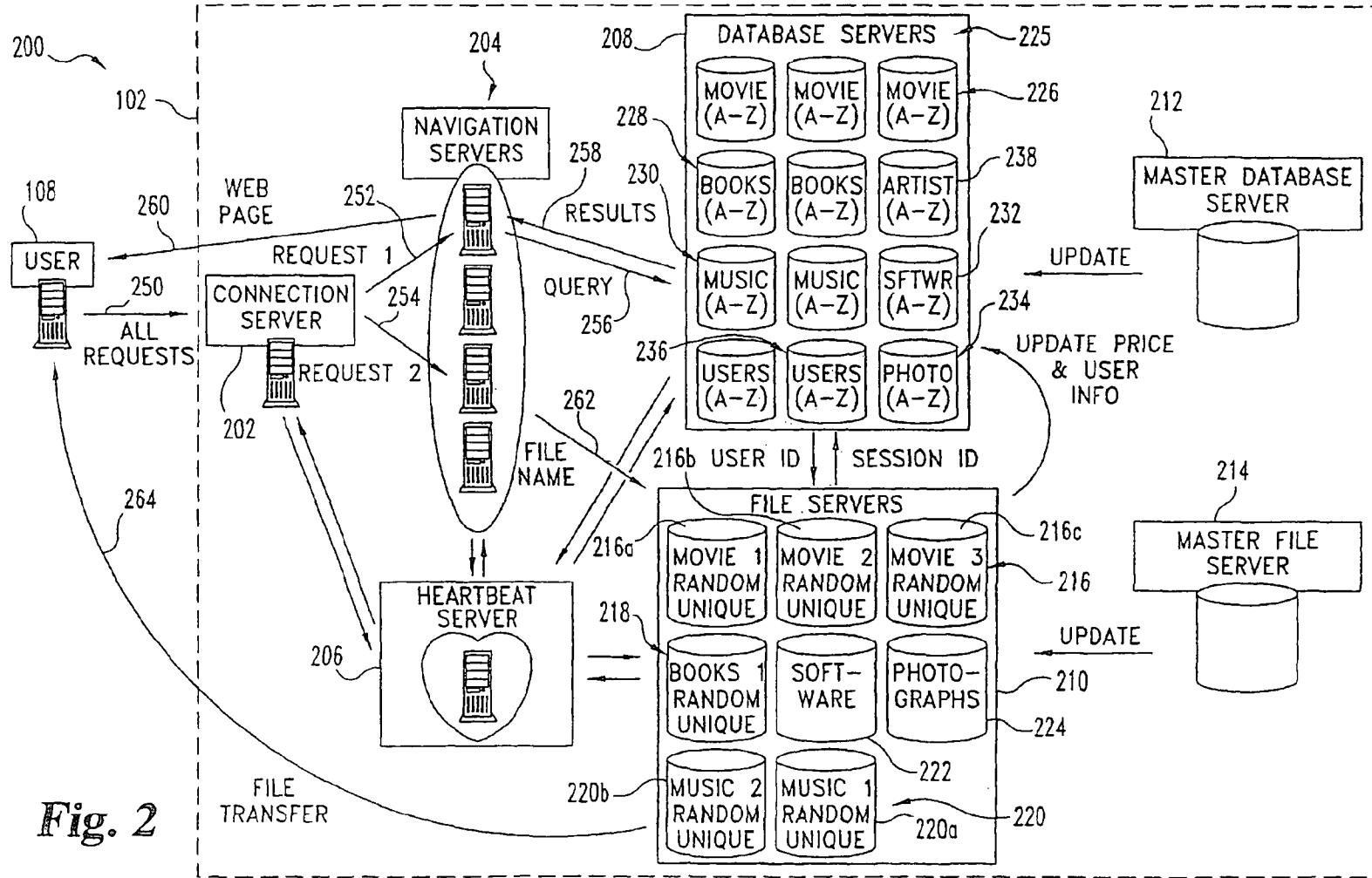
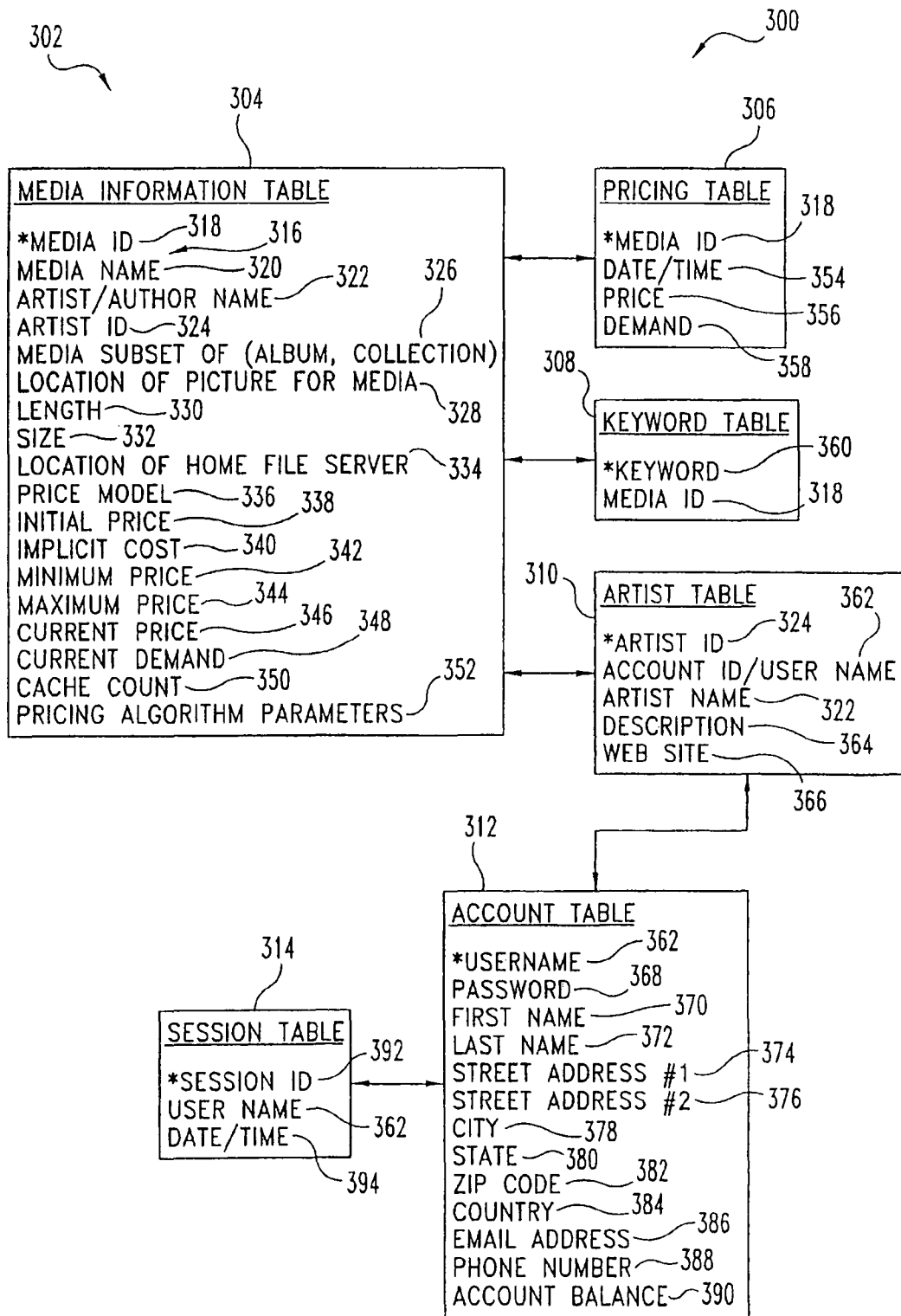
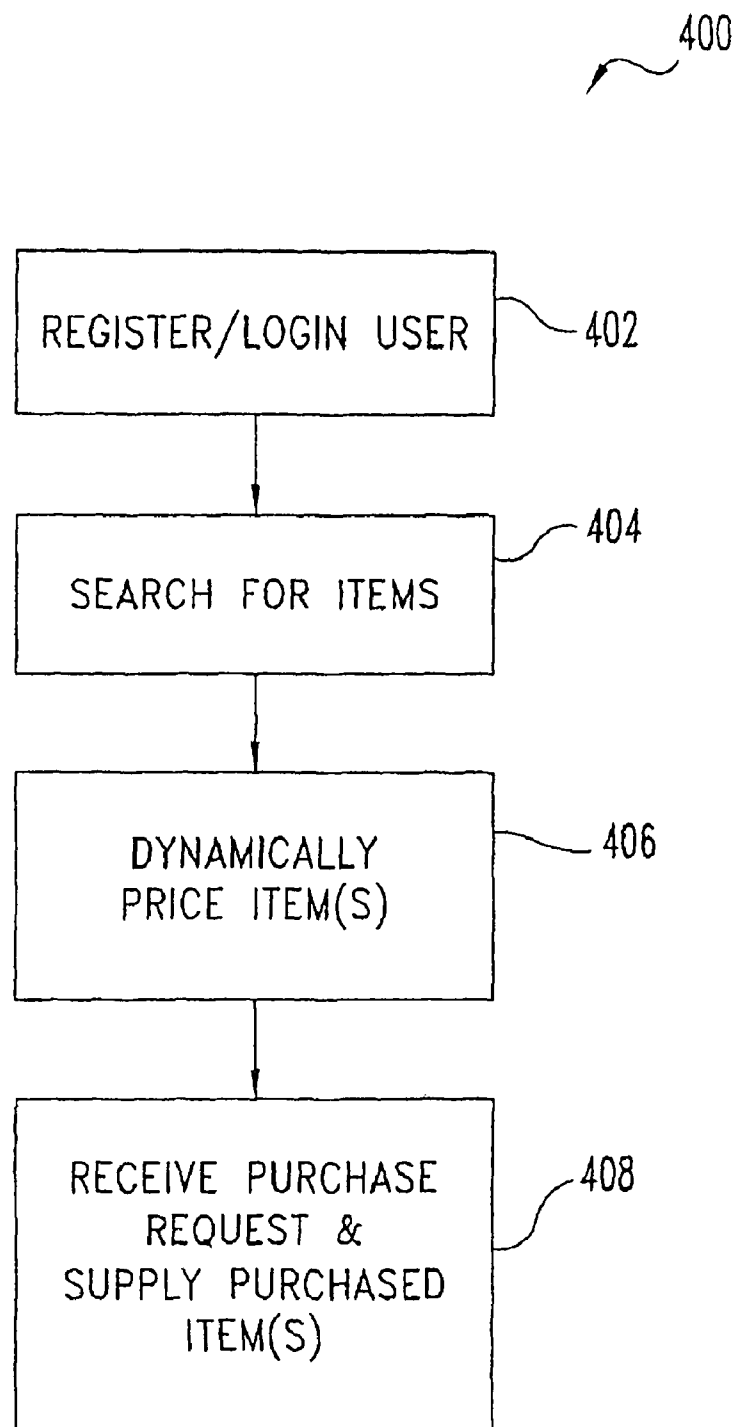


Fig. 1



**Fig. 3**

**Fig. 4**

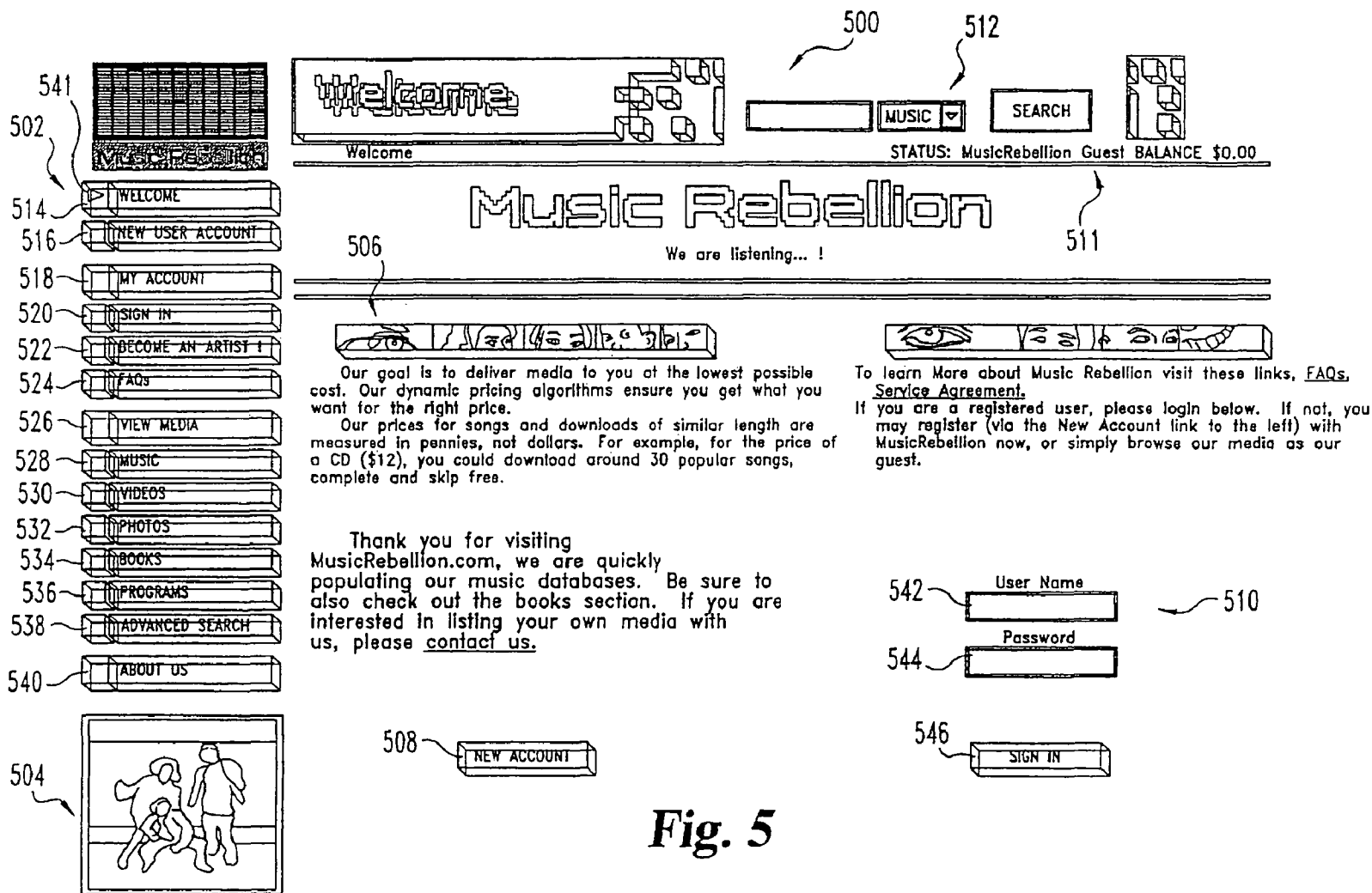


Fig. 5

Fig. 6

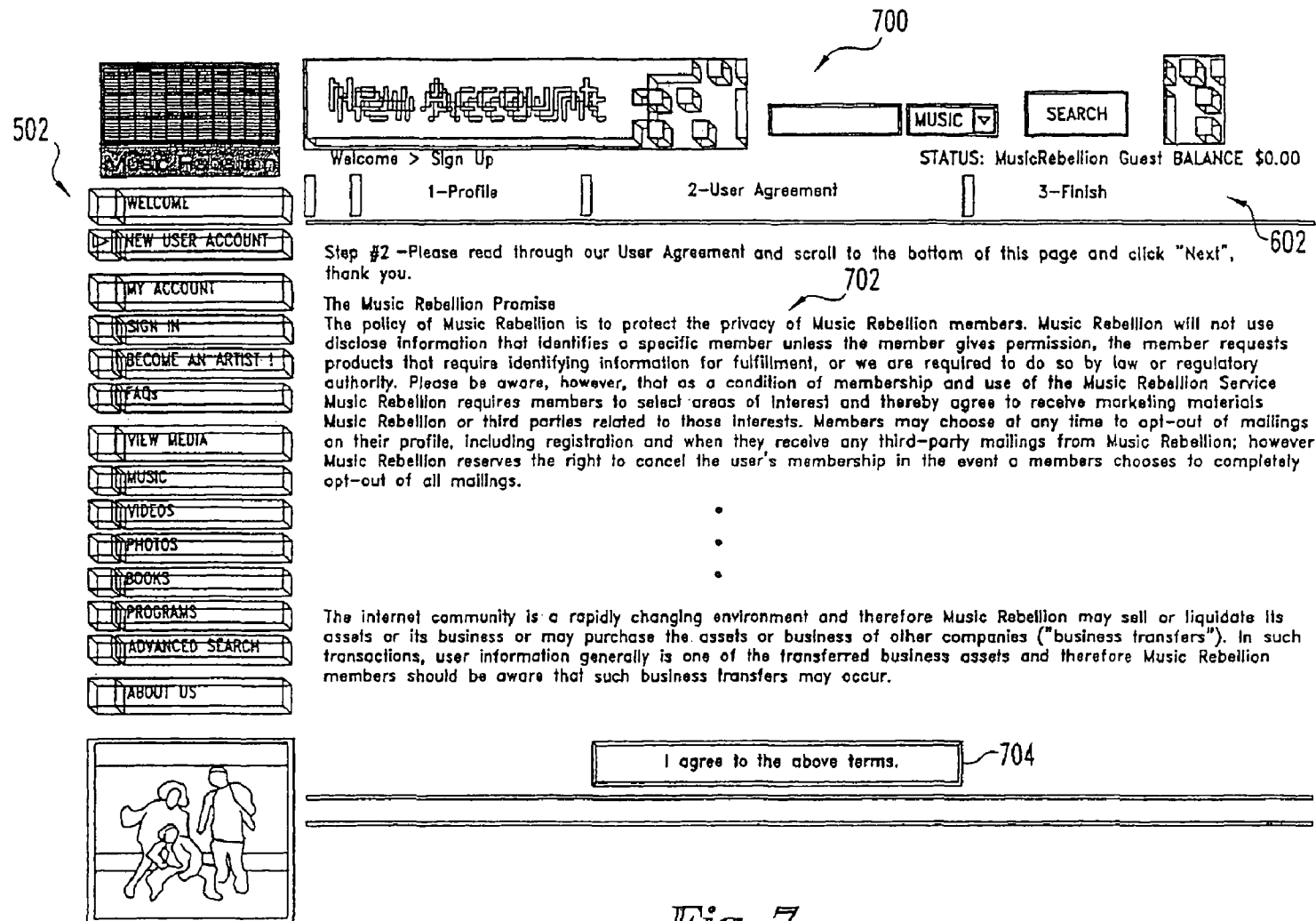


Fig. 7

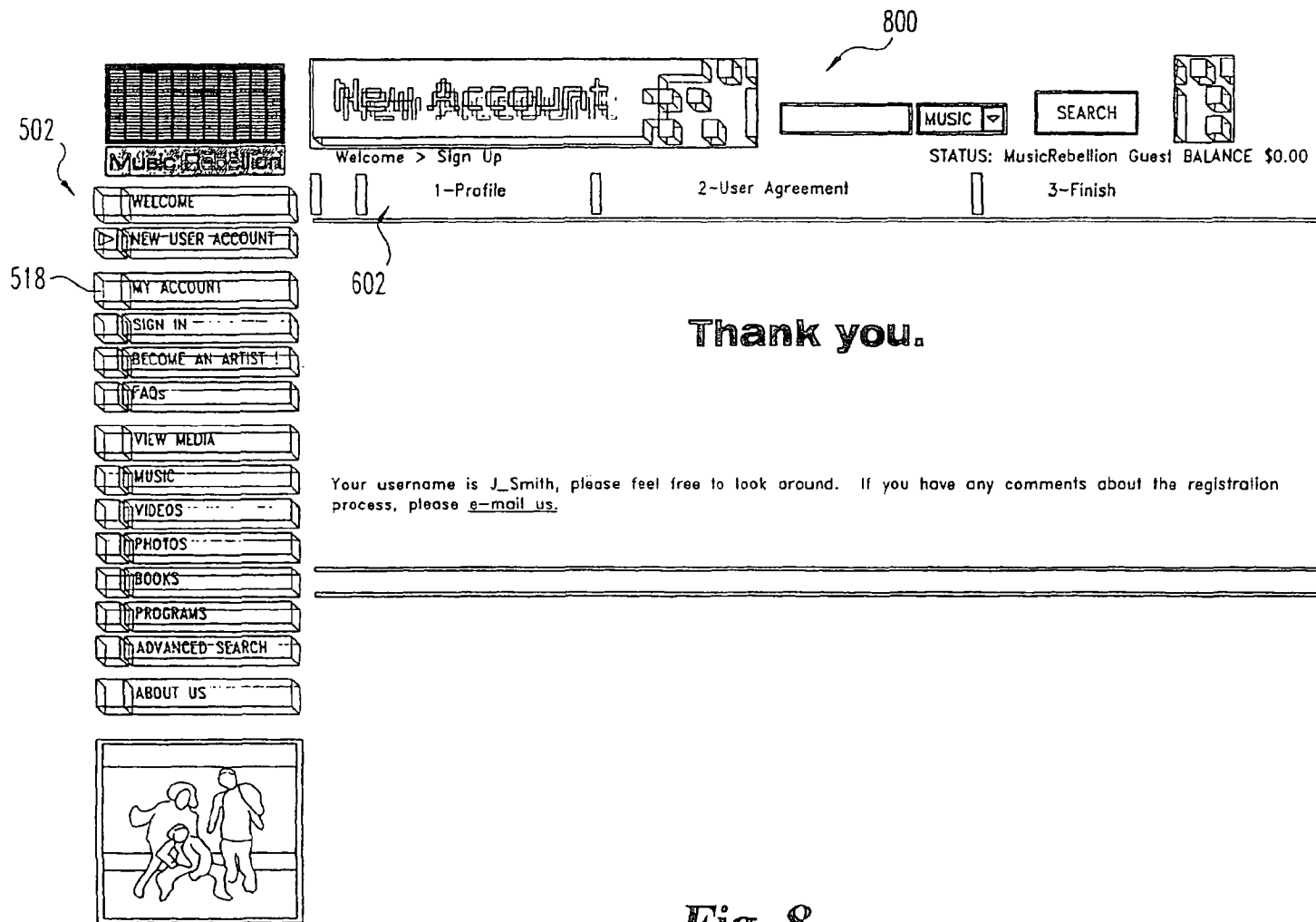
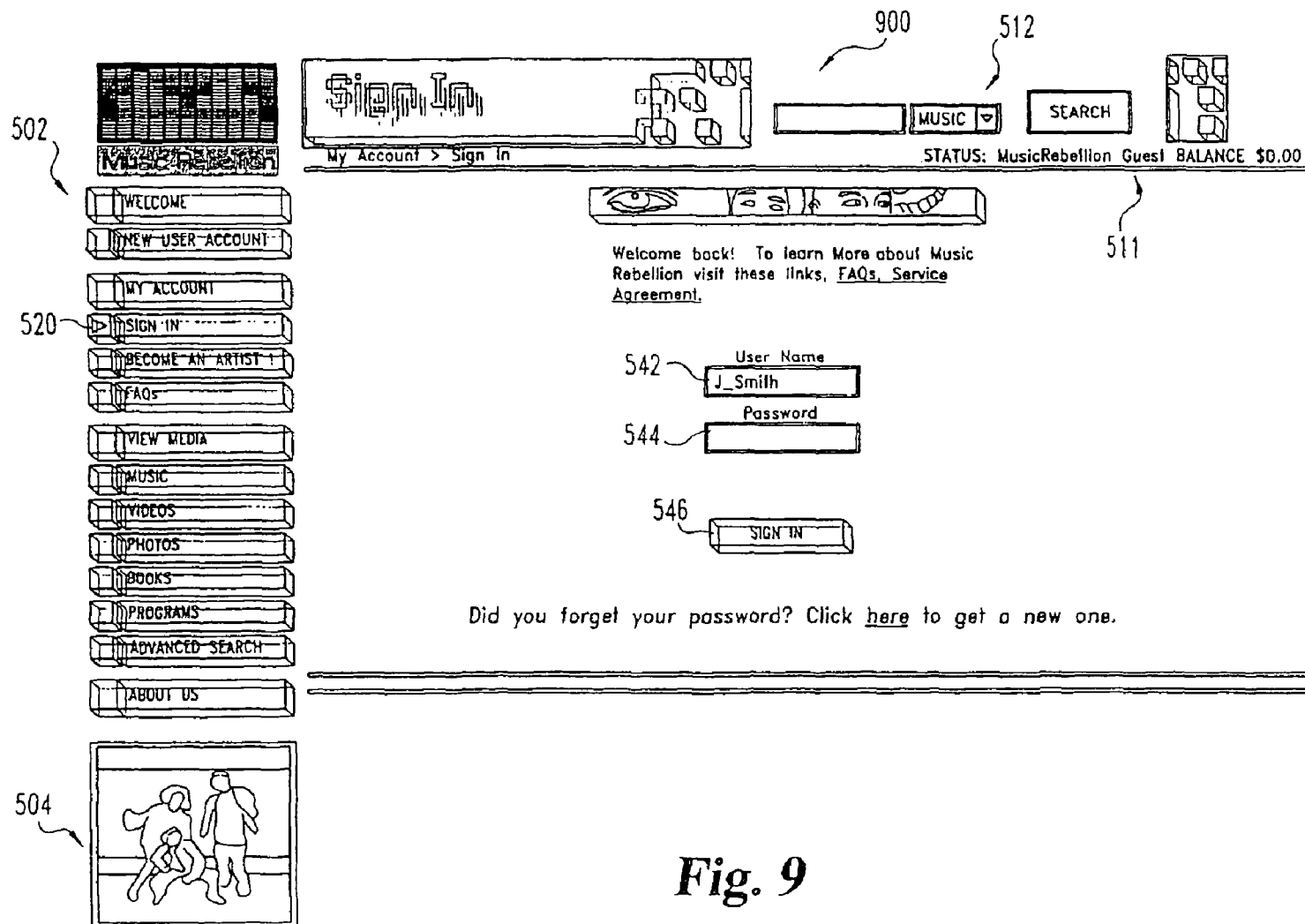


Fig. 8

**Fig. 9**

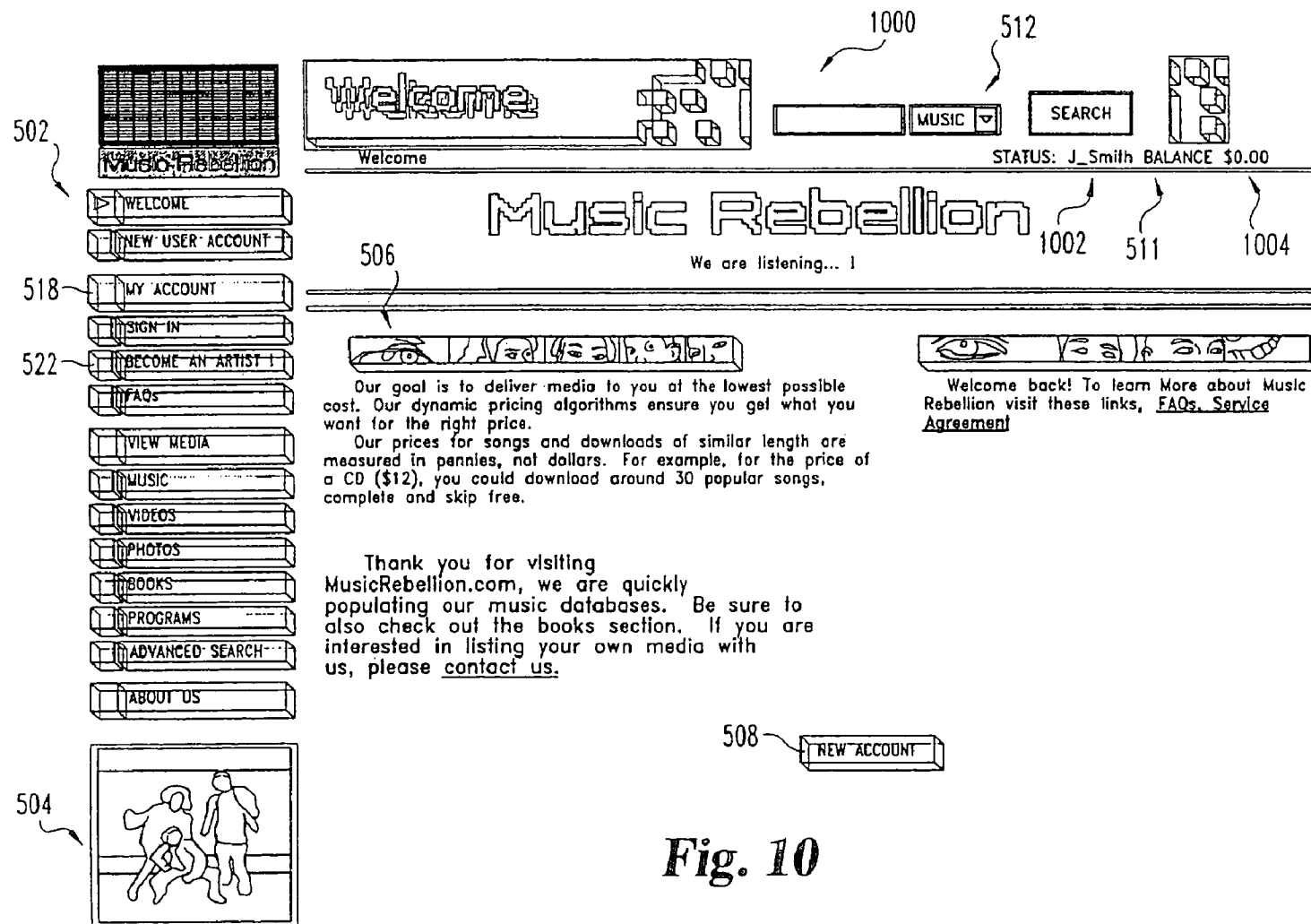
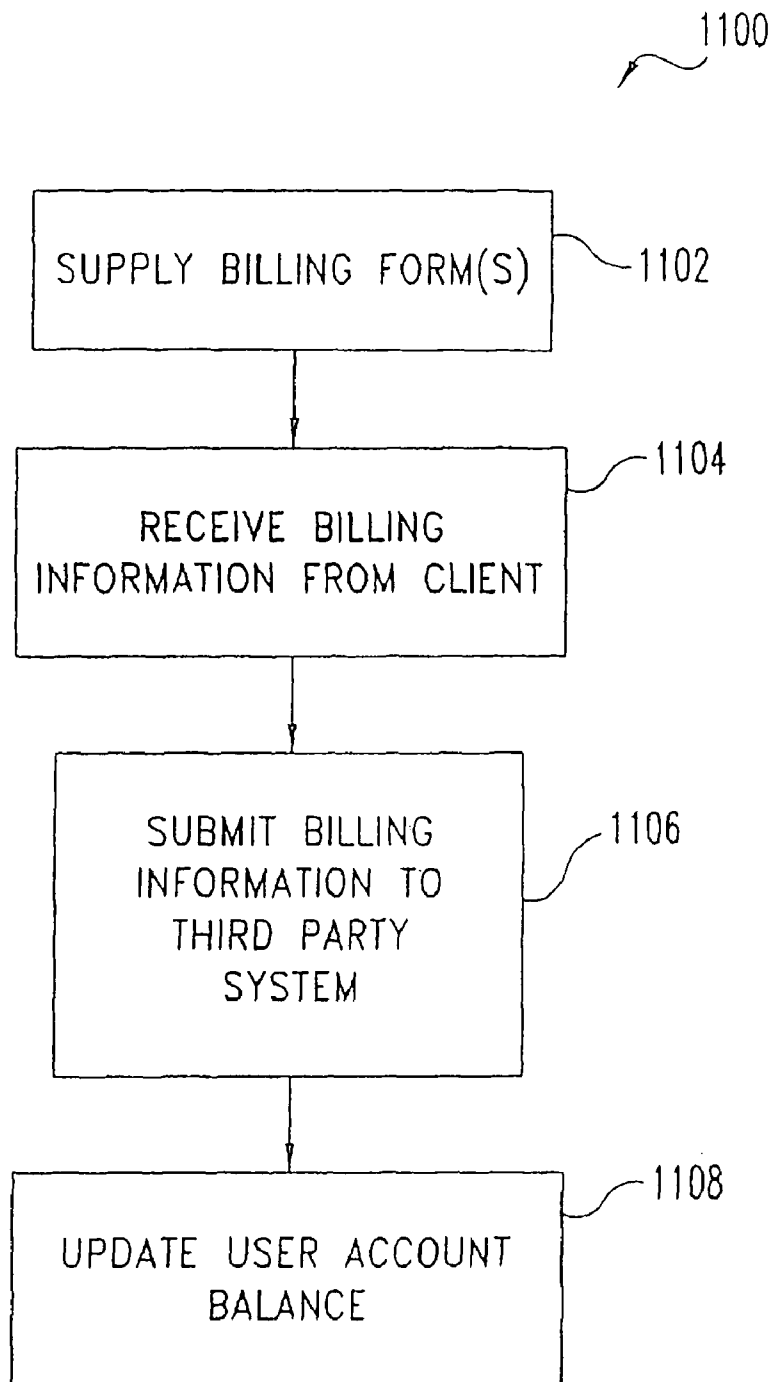


Fig. 10

*Fig. 11*

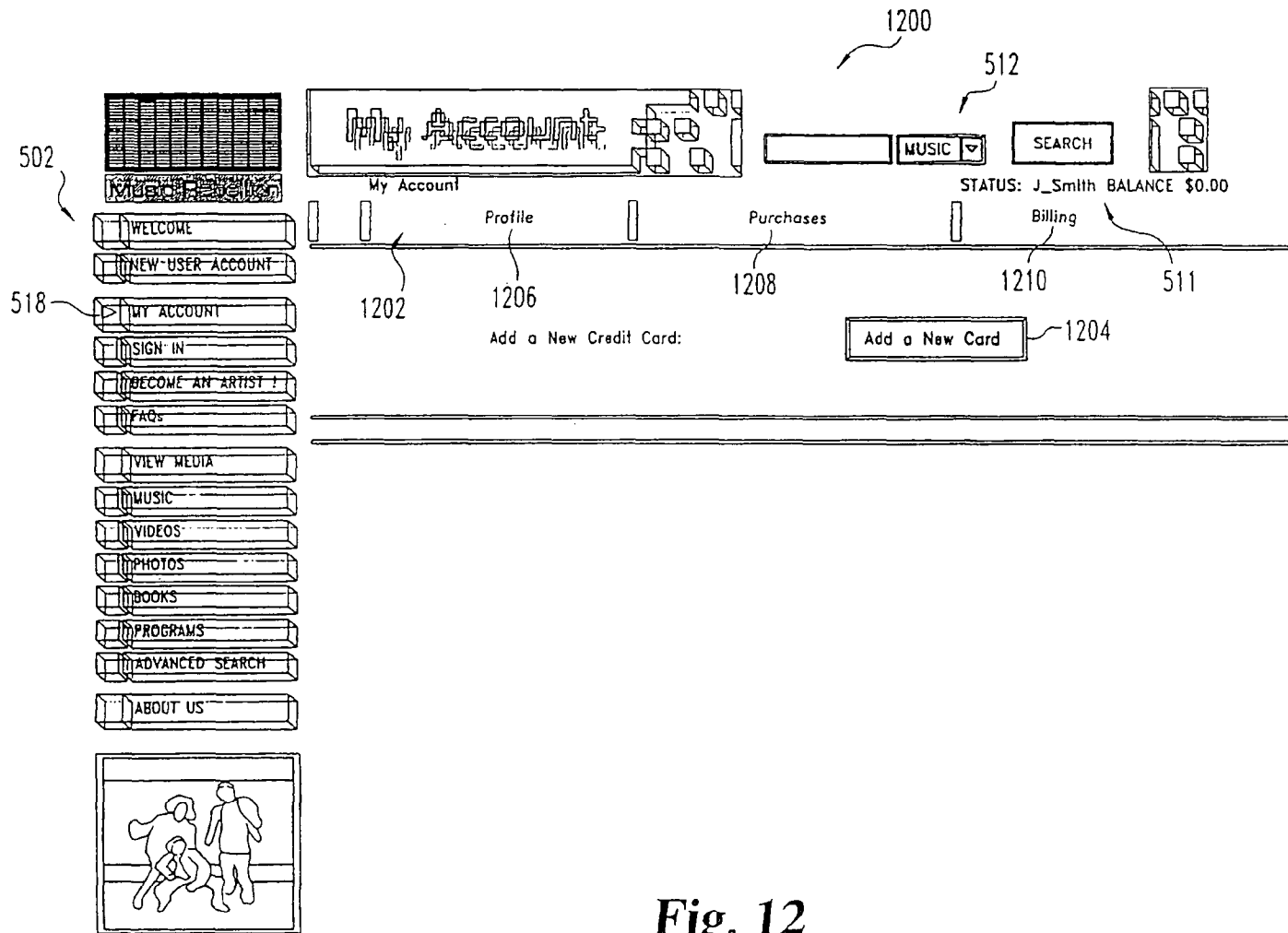


Fig. 12

1300

Welcome

MUSIC

SEARCH

STATUS: J_Smith BALANCE \$0.00

Profile Purchases Billing

1202 1206 1208 1210

Welcome, J_Smith. Your current MR balance is \$0.00

First Name: (James) 610

James

Street Address: (75 Main Street) 614

75 Main Street

City: (New York) 616

New York

Zip Code: (10005 or Province Code) 620

10005

Last Name: (Smith) 612

Smith

Street Address: -cont. (Suite #3)

State: (New York or NY) 618

New York

Country: 622

United States

E-mail Address: (jsmith@earthlink.com) 624

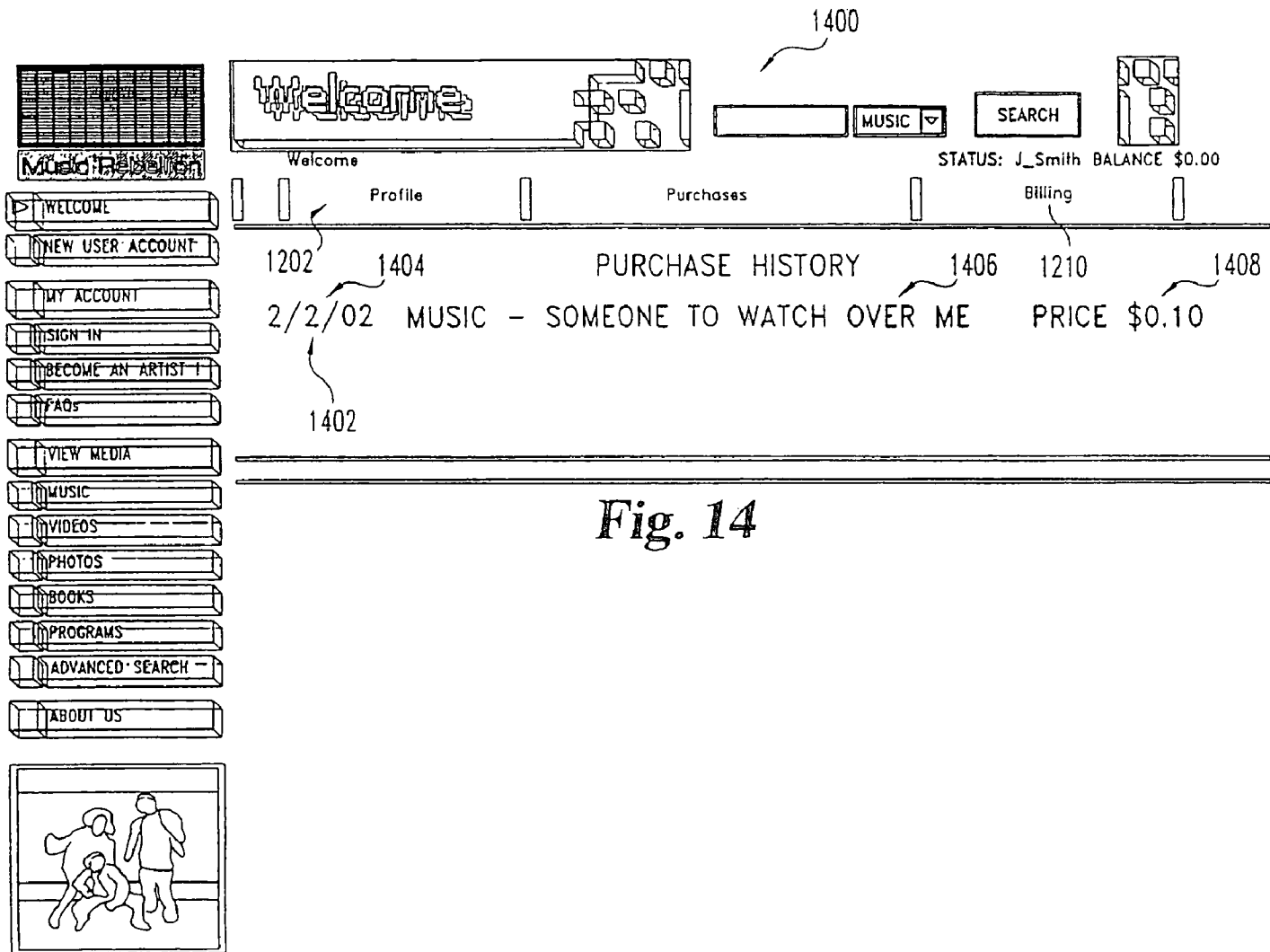
jsmith@earthlink.com

Phone Number: (212-555-1212) 626

212-555-1212

1302 Save 1304 Cancel

Fig. 13

*Fig. 14*

502

WELCOME
NEW USER ACCOUNT
MY ACCOUNT
SIGN IN
BECOME AN ARTIST
FAQs
VIEW MEDIA
MUSIC
VIDEOS
PHOTOS
BOOKS
PROGRAMS
ADVANCED SEARCH
ABOUT US

My Account

Profile Purchases Billing

STATUS: J_Smith BALANCE \$0.00

Please fill out the following information completely:

First Name: (James) 1504

Last Name: (Smith) 1506

Street Address: (75 Main Street) 1508

City: (New York) 1510

State: (New York or NY) 1512

Zip Code: (10005 or Province Code) 1514

Country: 1516
United States

CreditCard Type: 1518
Visa

CreditCard Number: 1520

Expiration Date: 1522
01 / 01

Initial Charge: 1524
20.00

E-mail Address: (jsmith@earthlink.com) 1526

Phone Number: (212-555-1212) 1528

1530 Save

Fig. 15

502

1600

1602

512

1606

1604

View Media > Search Media

STATUS: J_Smith BALANCE \$0.00

Search over All Fields: 1608

1610

Media Type: Music 1612

Genre: All 1614

Search Song Name 1616

Maximum # Results 10 1618

Less Than \$ e.g. 10.00 1620

Released After: 1622

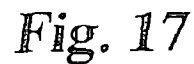
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Sort By: Song Name 1626

1628 Search

538

Fig. 16



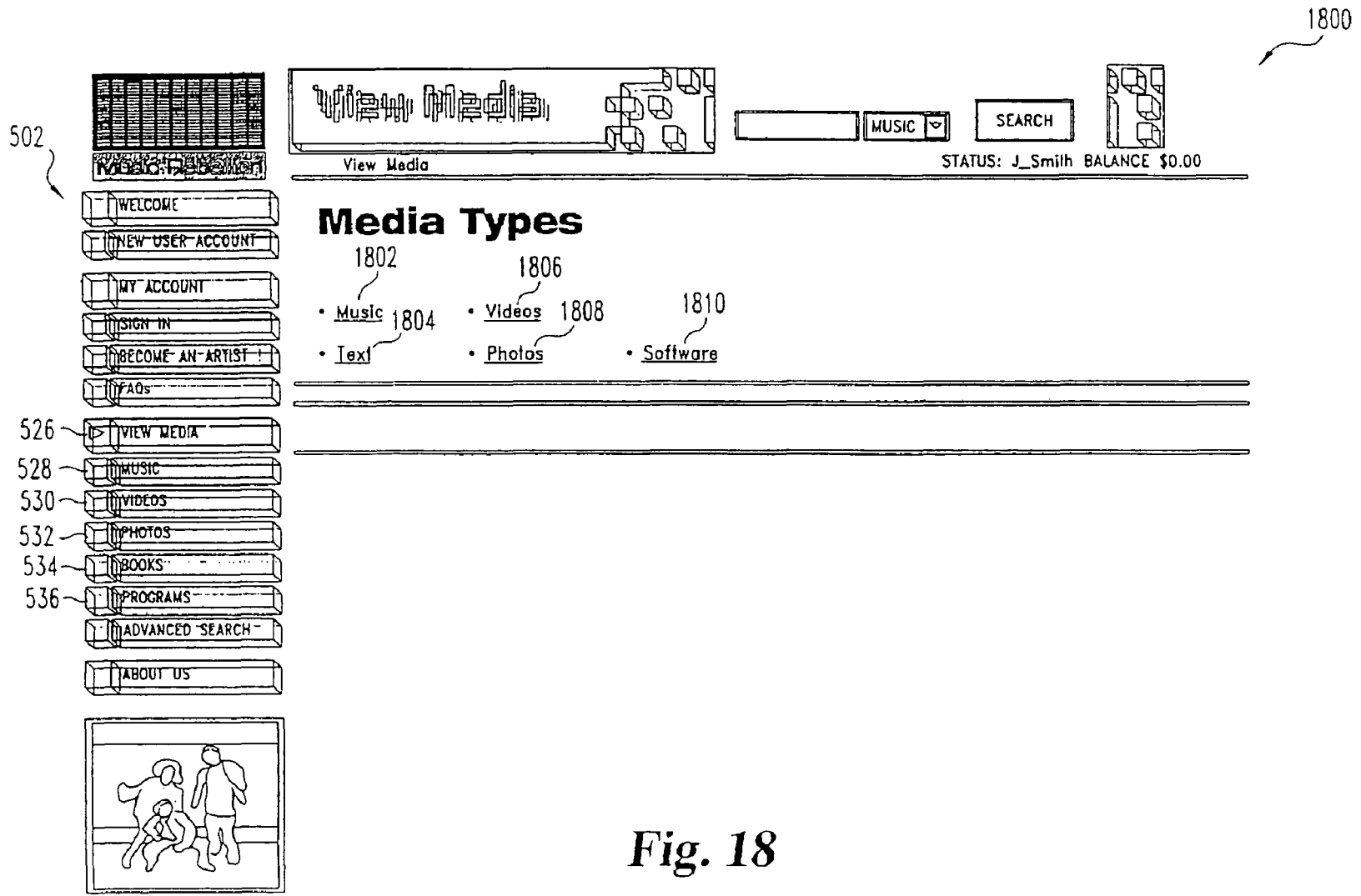


Fig. 18

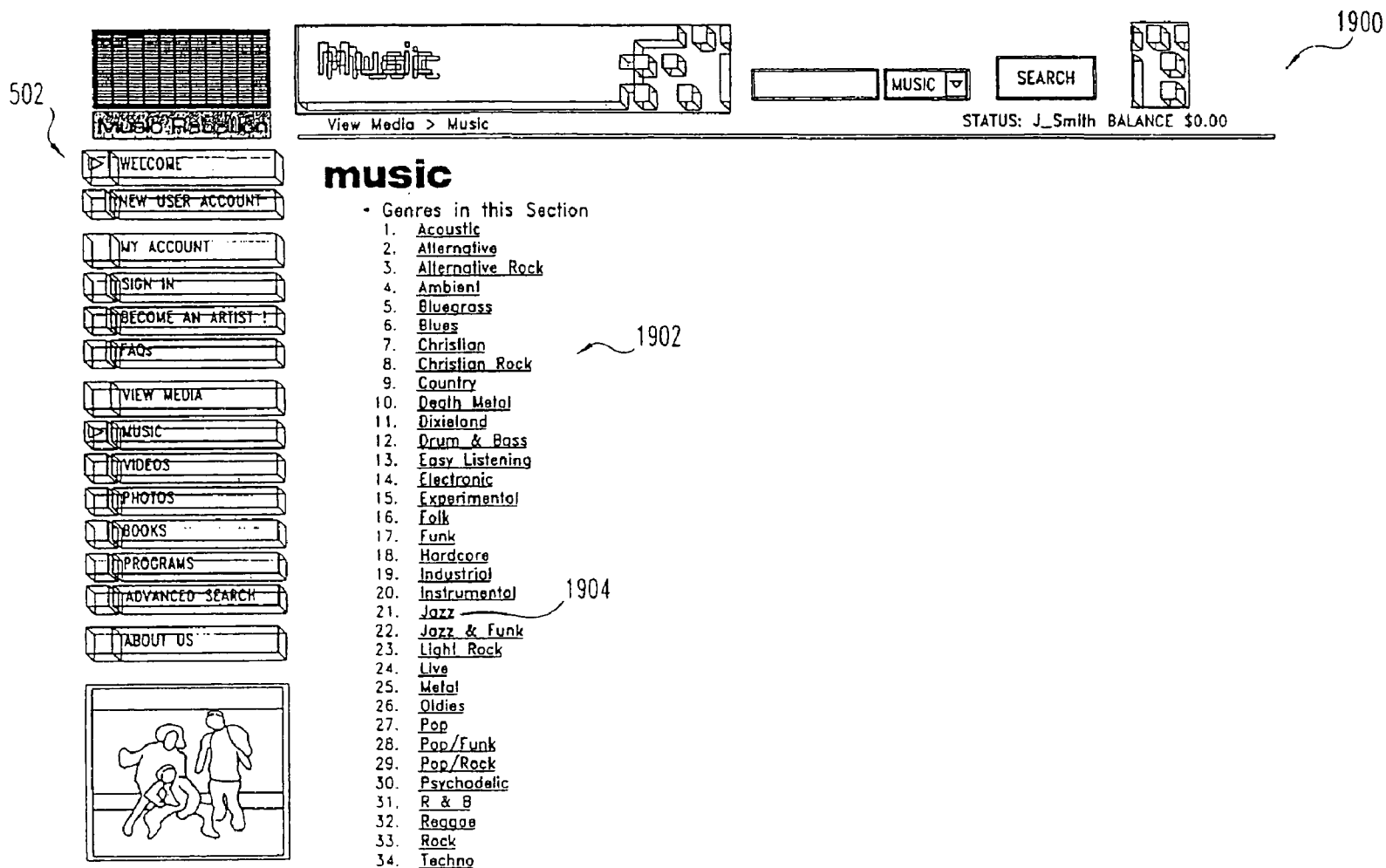
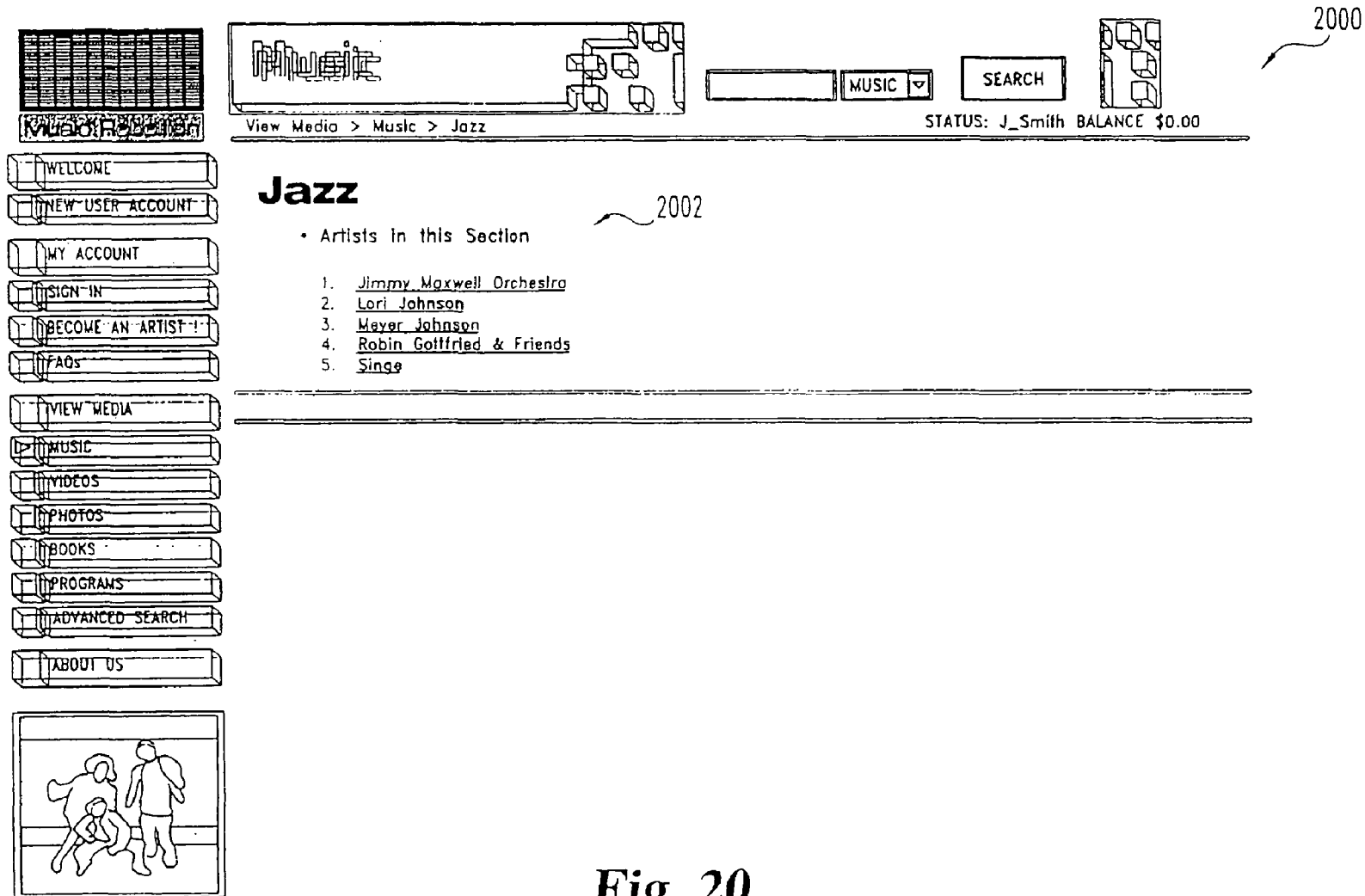
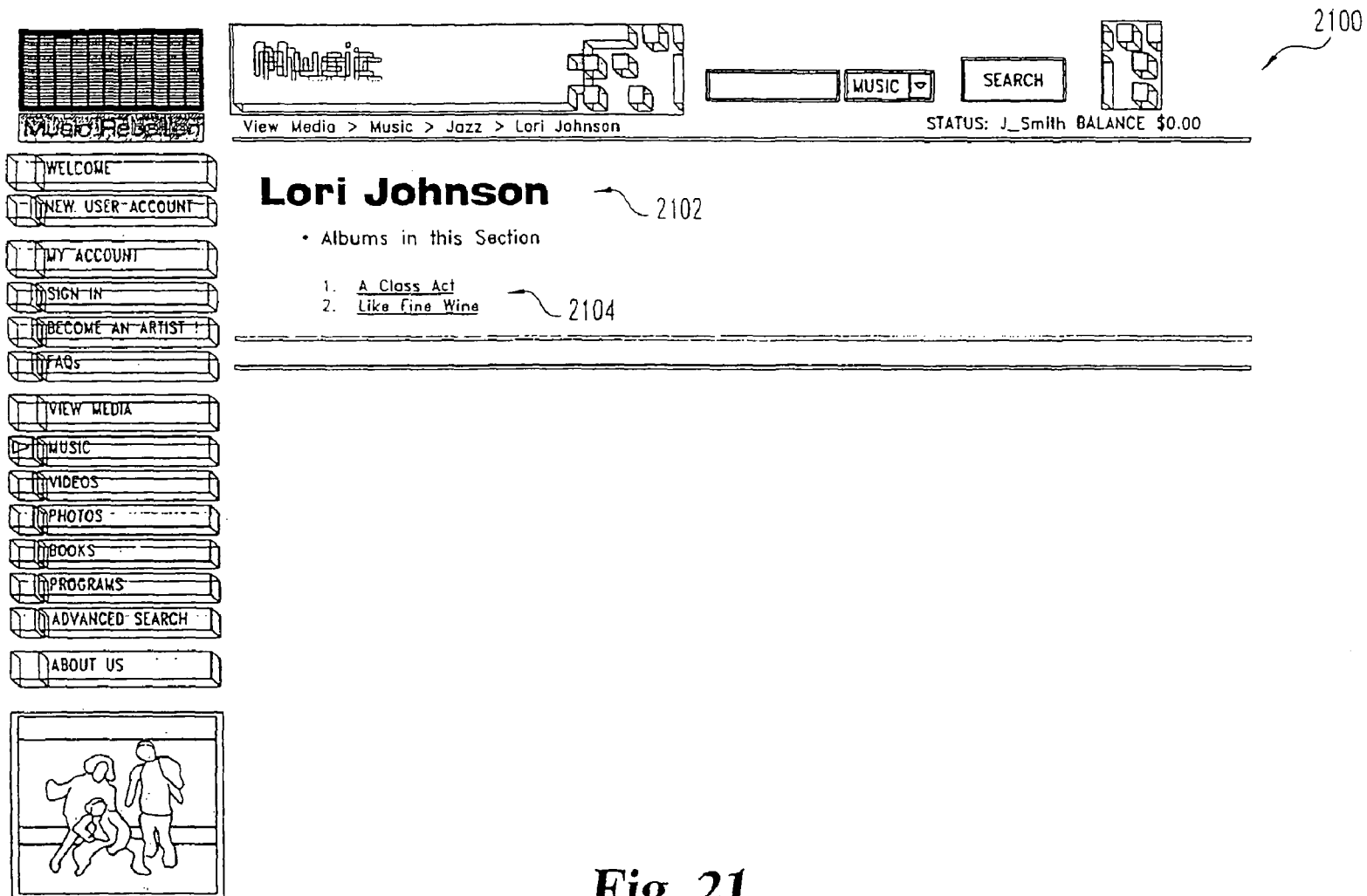
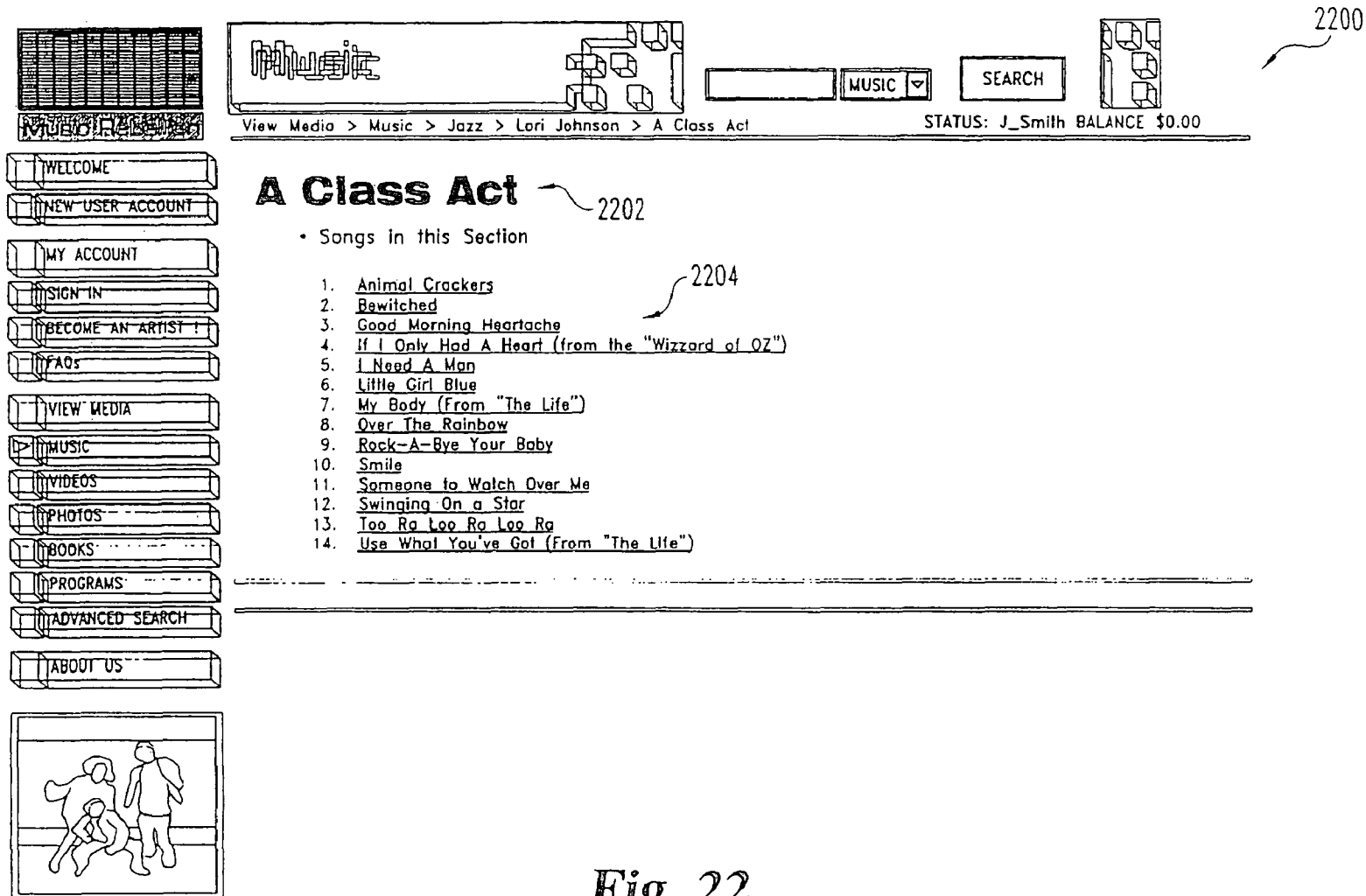


Fig. 19







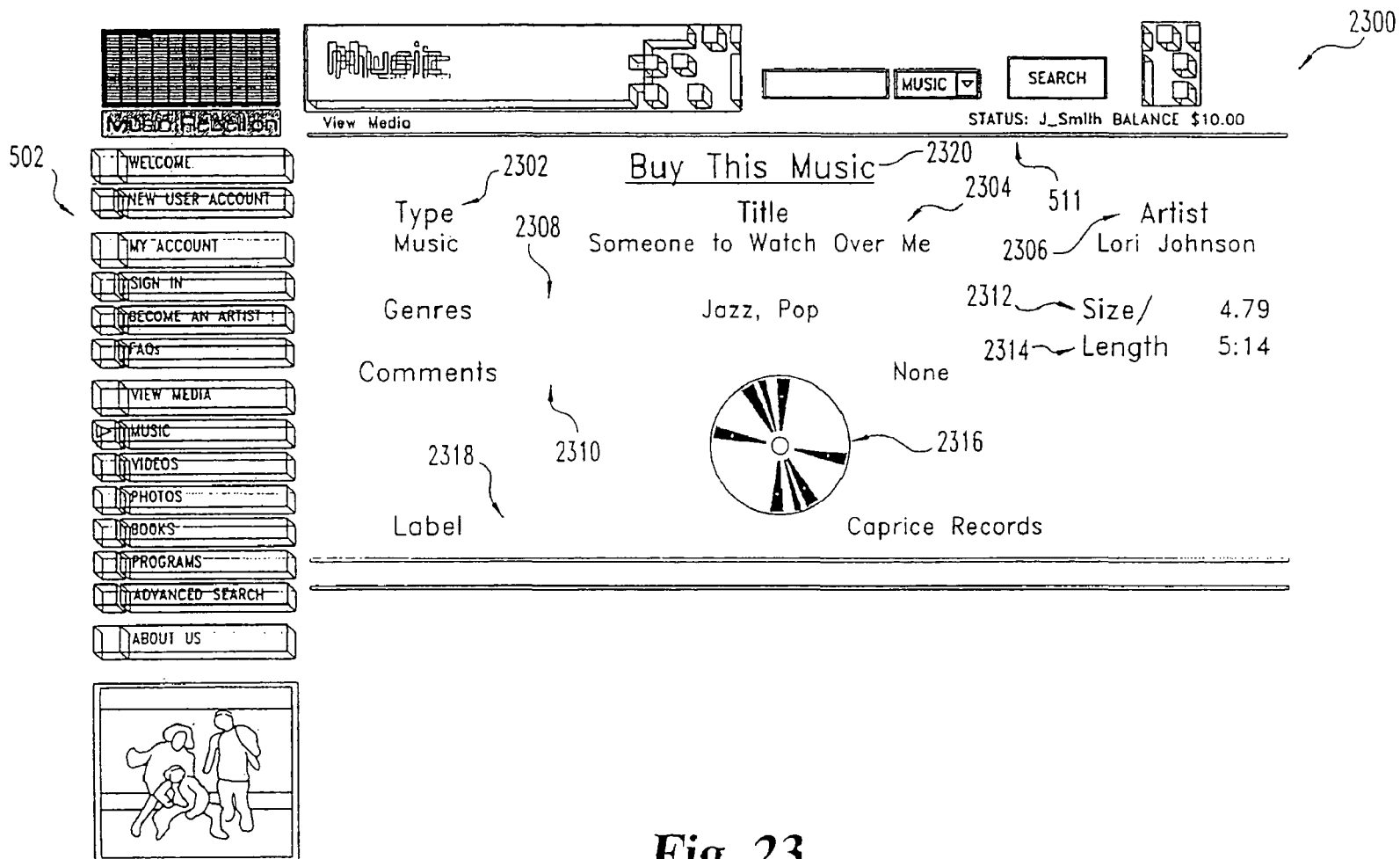
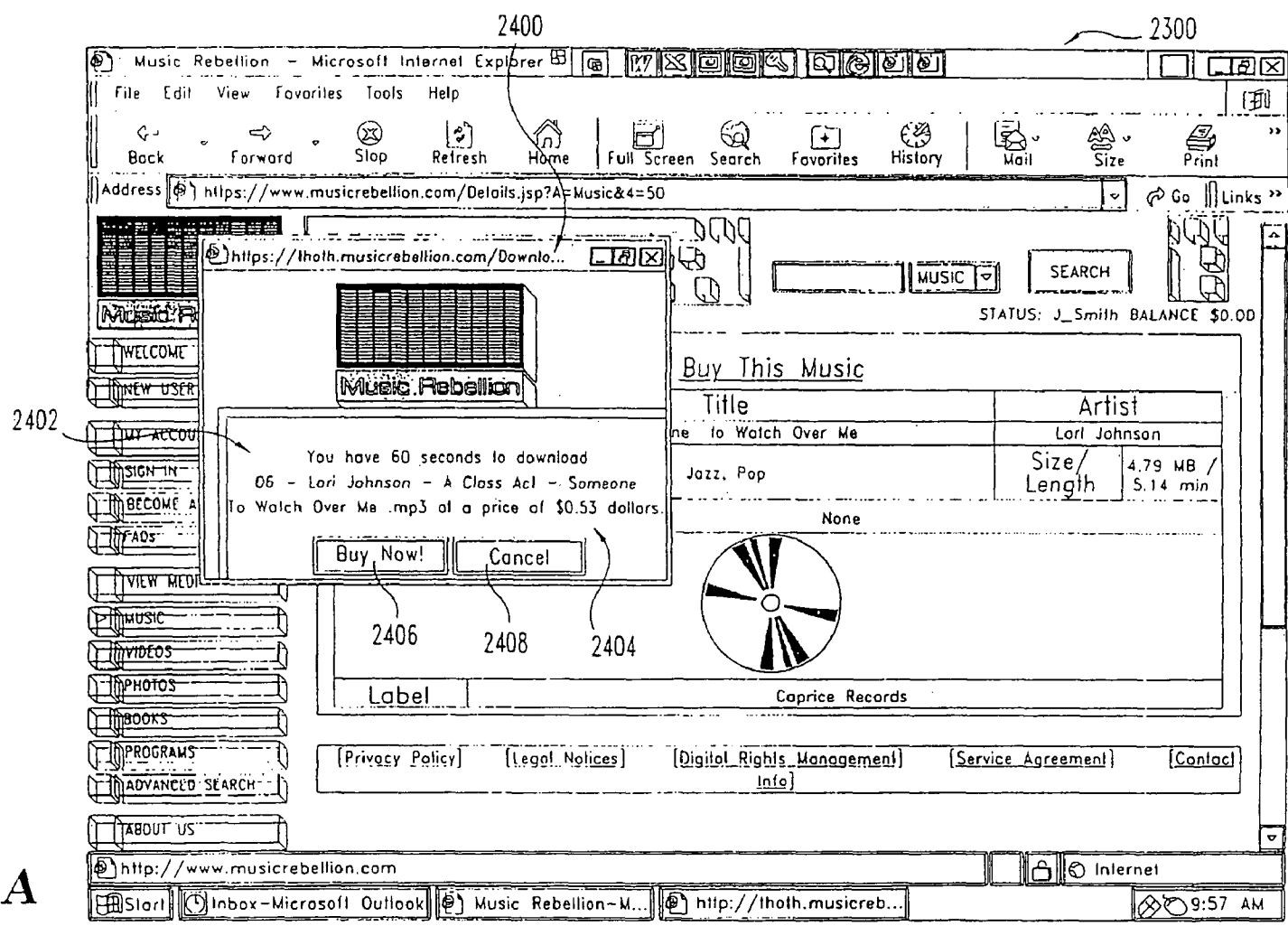


Fig. 23

Fig. 24A



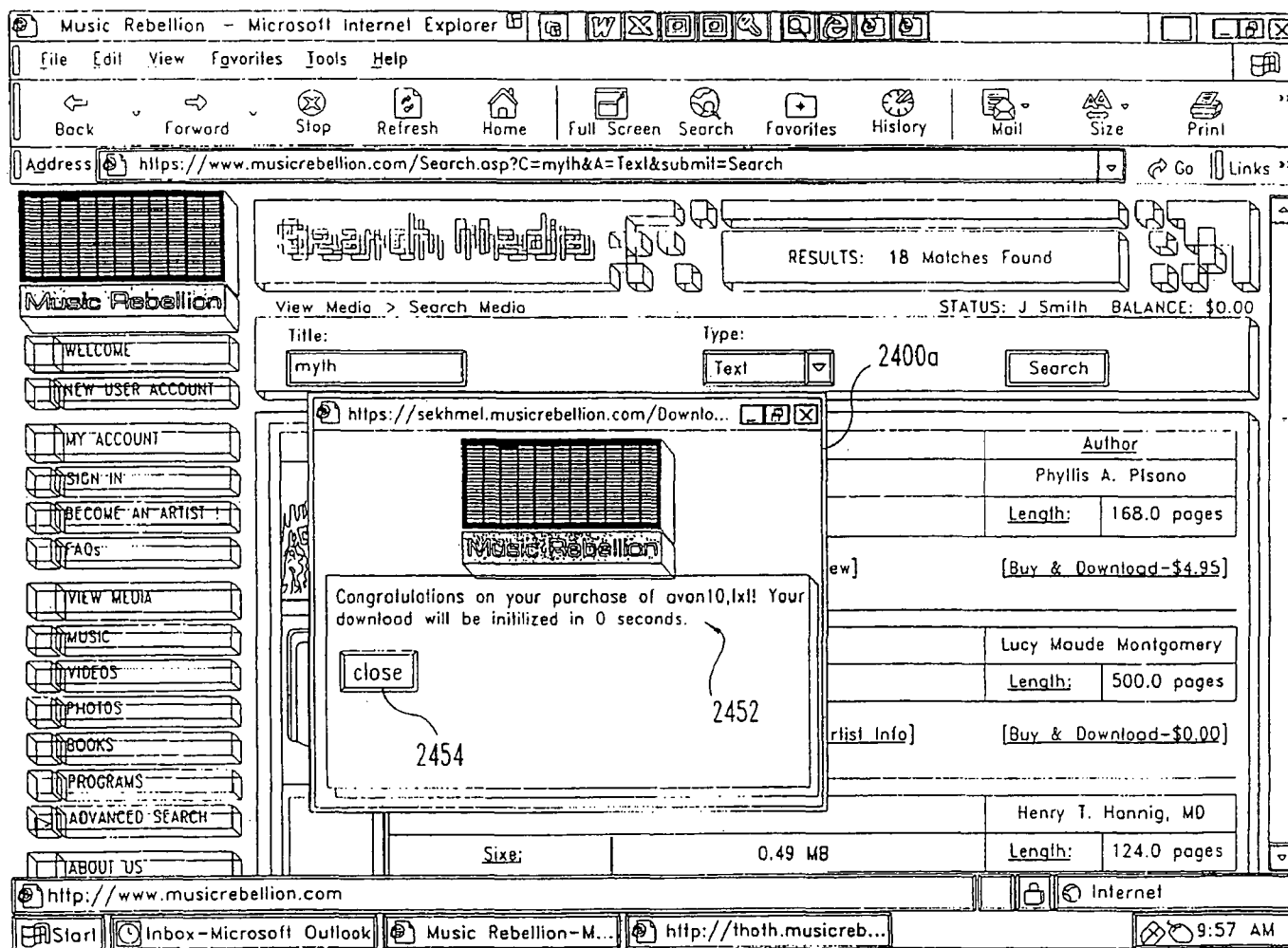
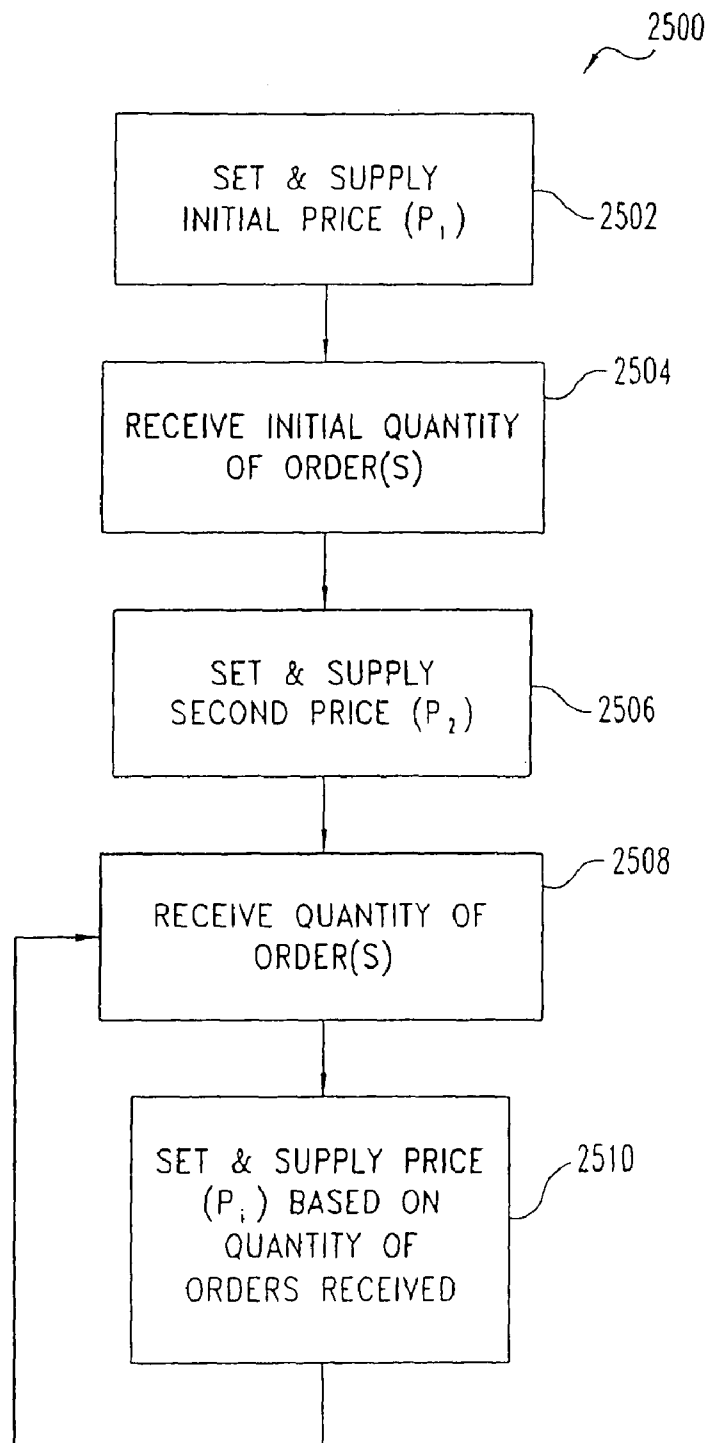
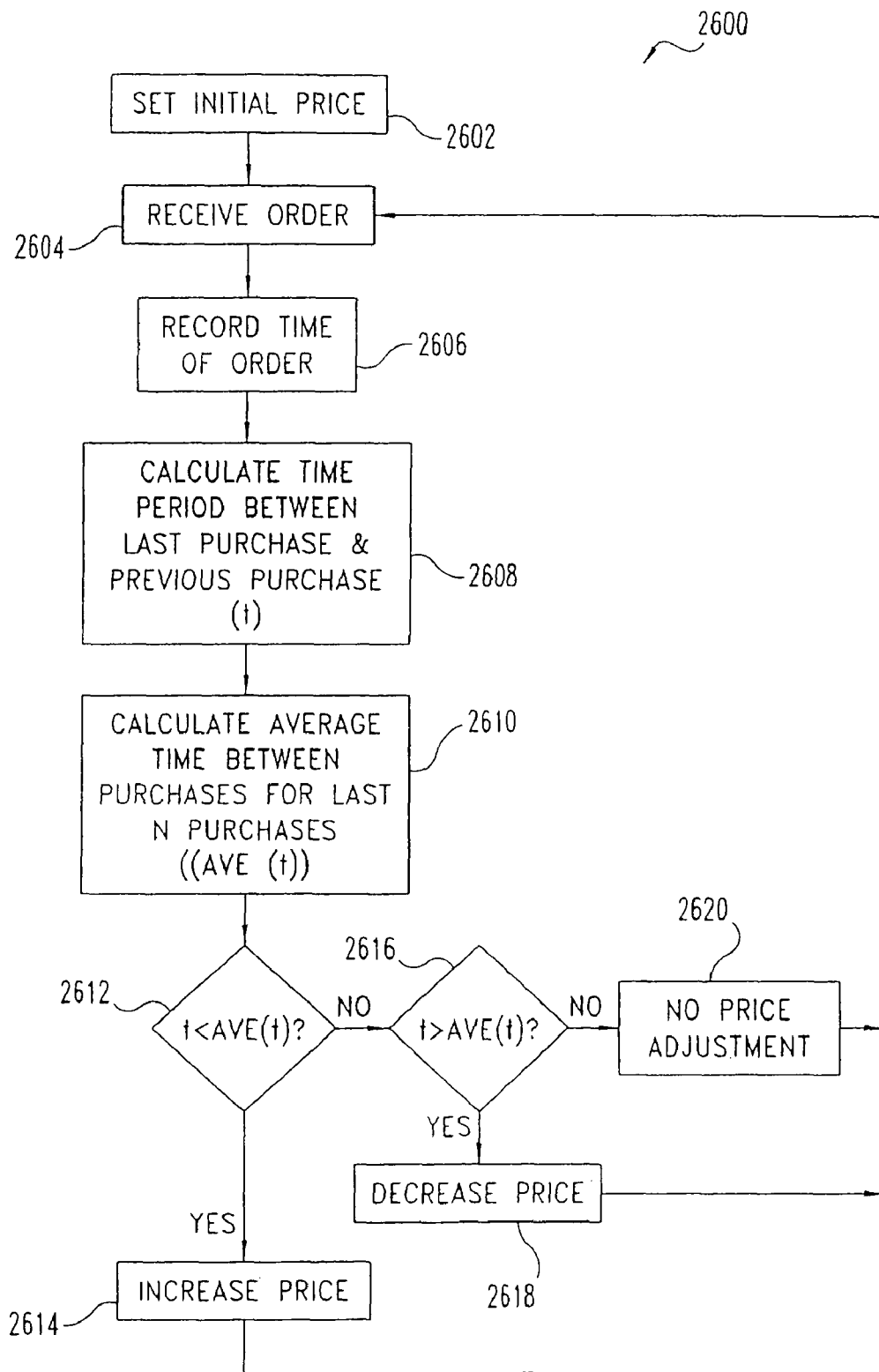
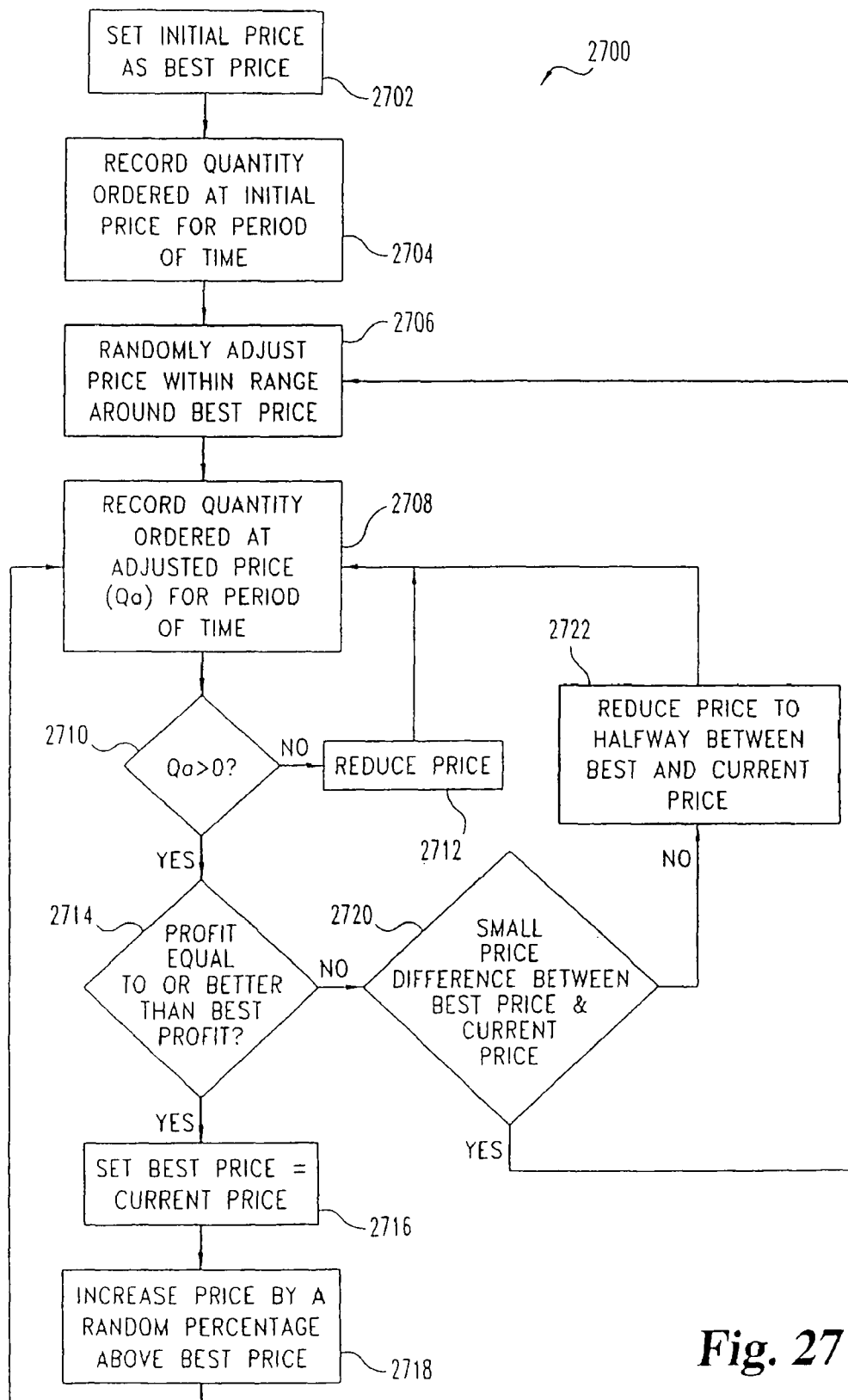


Fig. 24B

**Fig. 25**

**Fig. 26**

**Fig. 27**

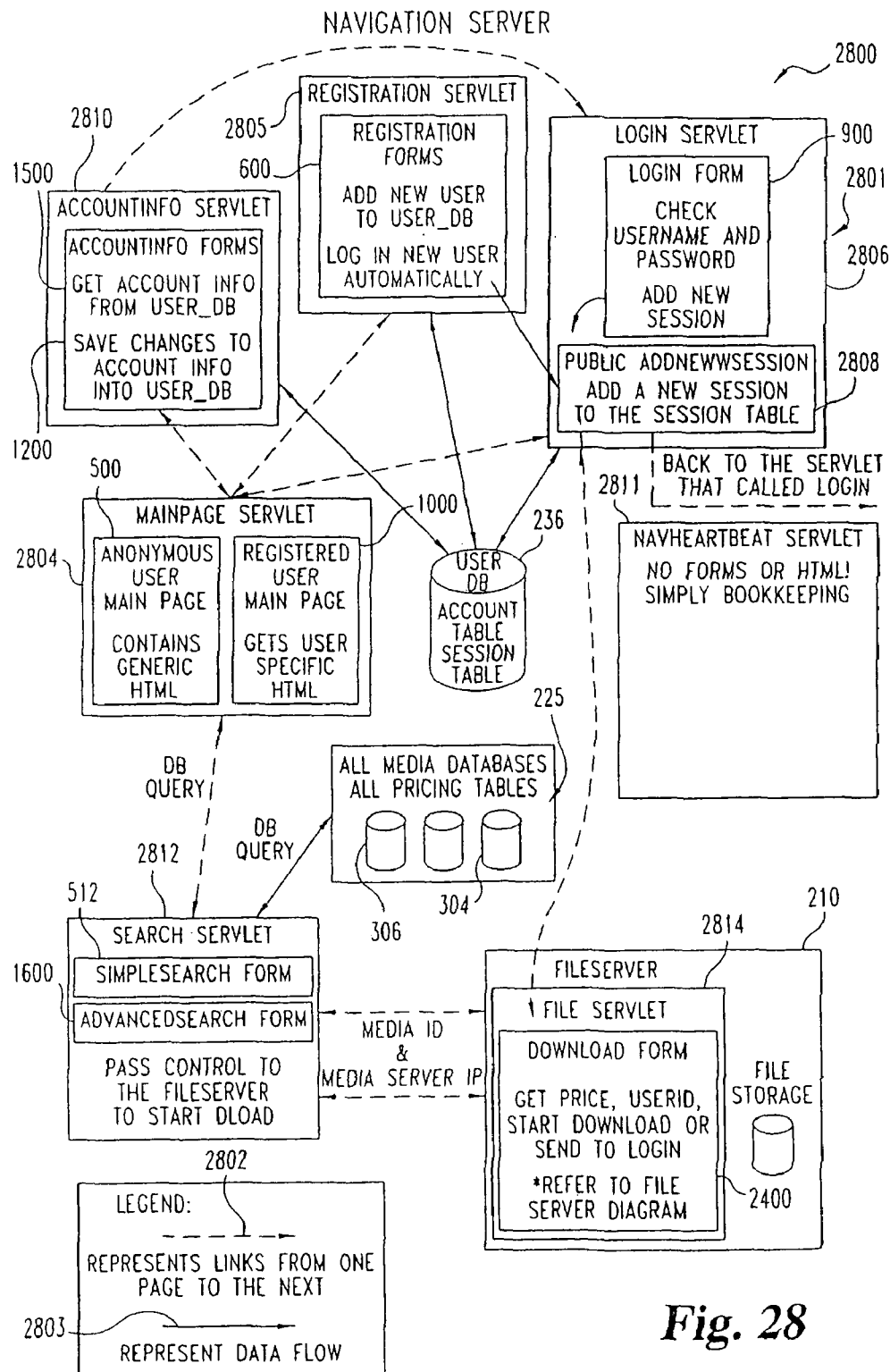


Fig. 28

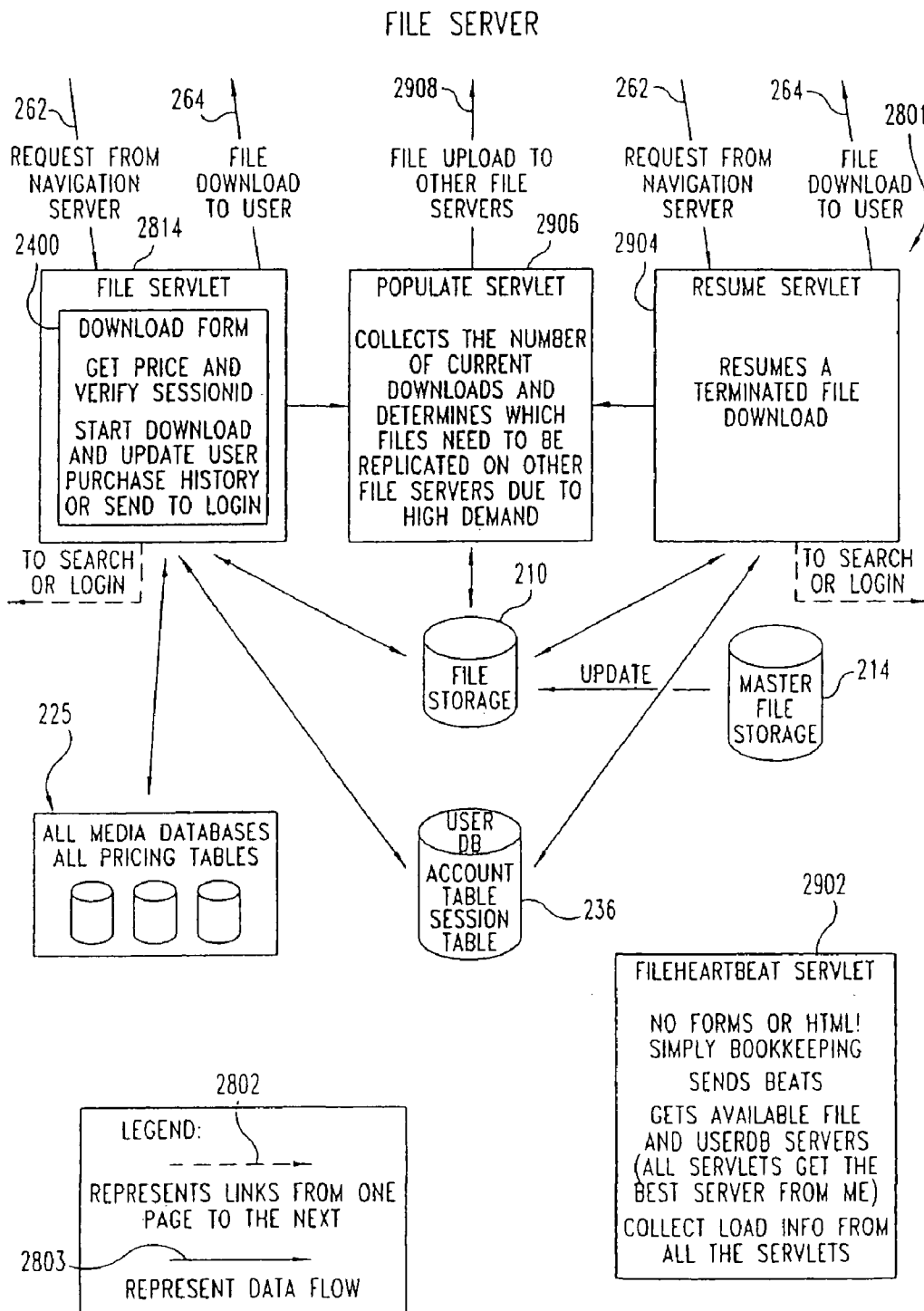
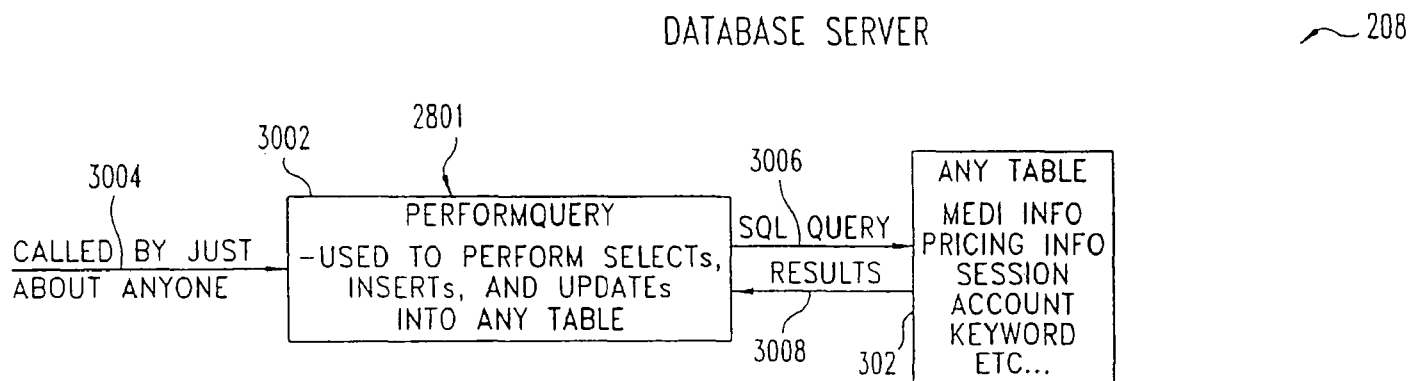
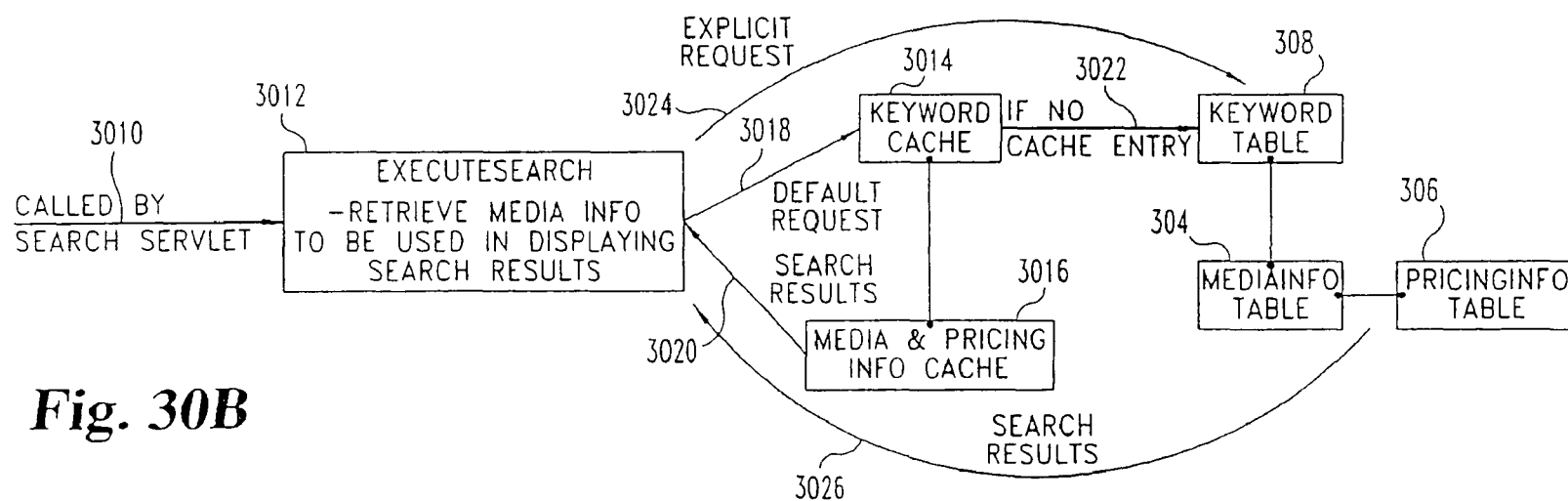


Fig. 29

**Fig. 30A****Fig. 30B**

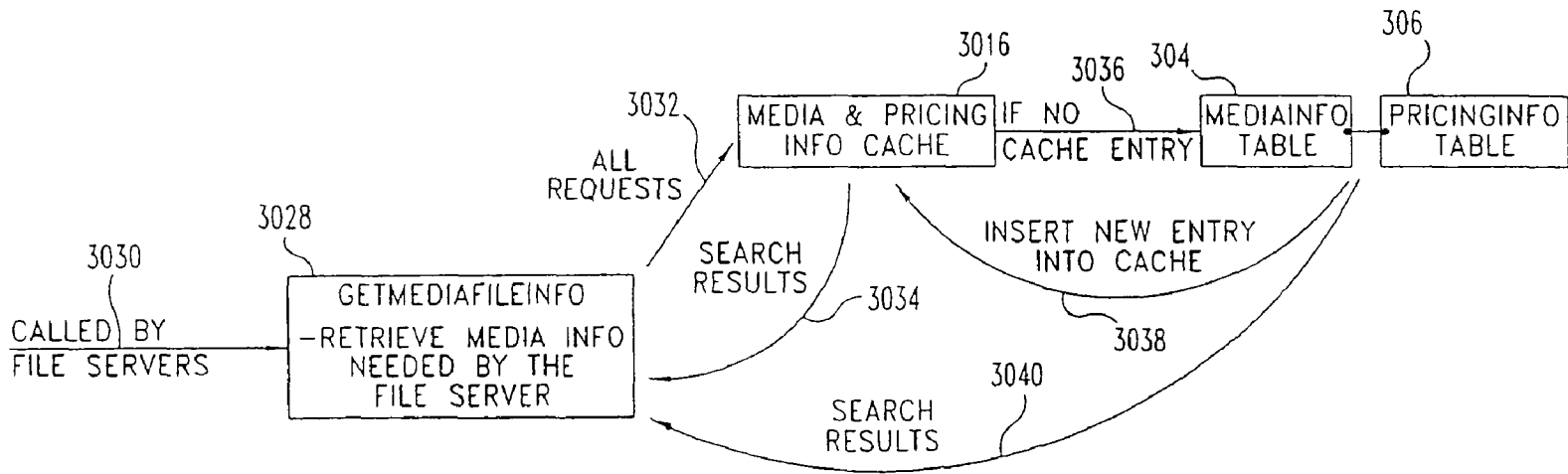


Fig. 30C

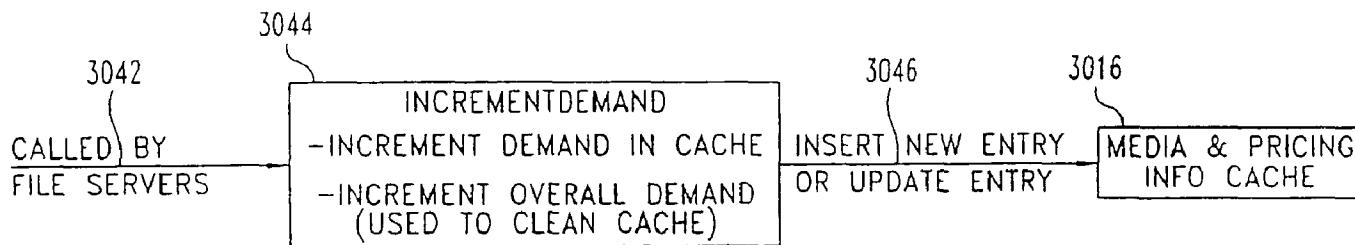
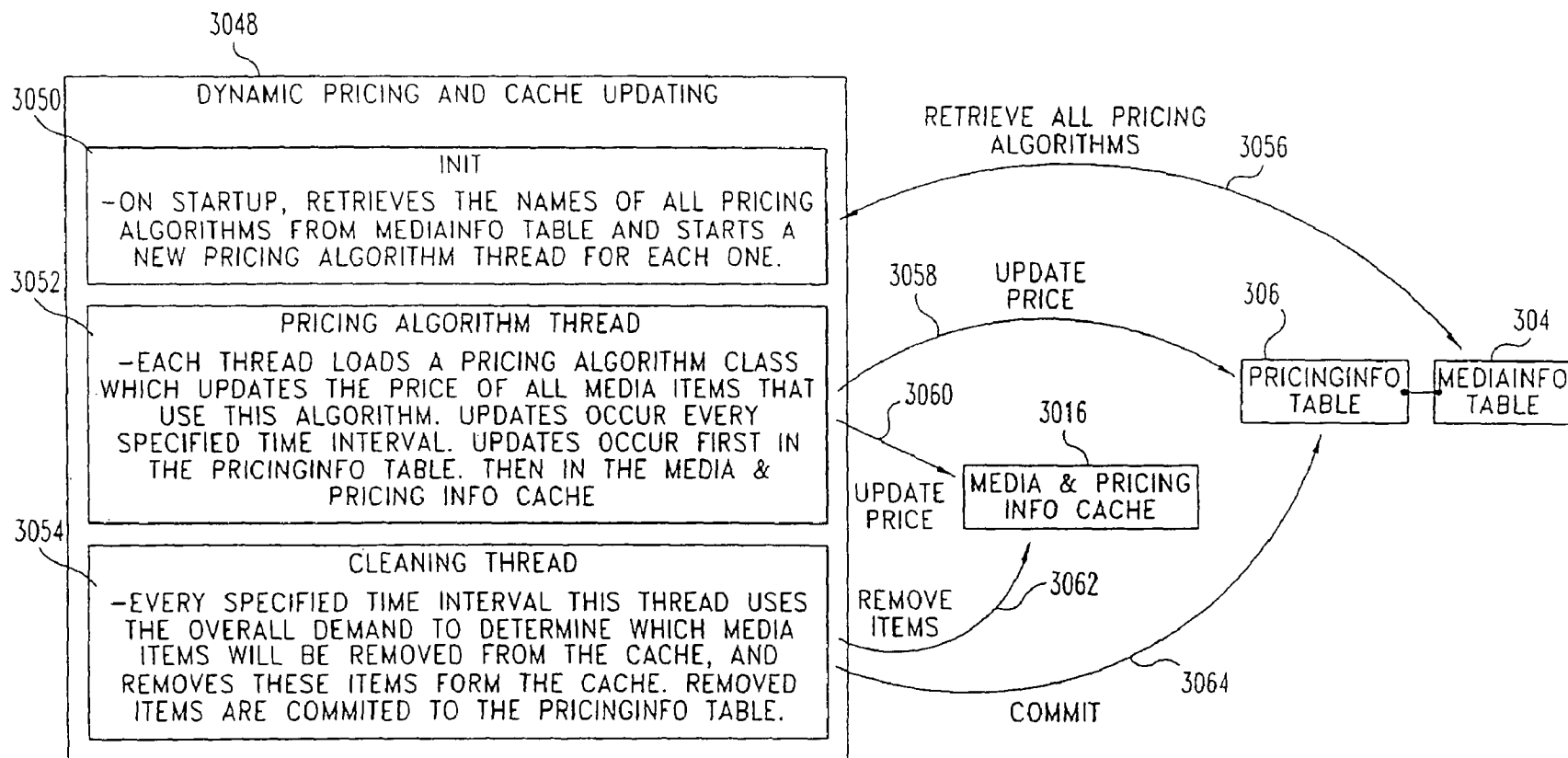
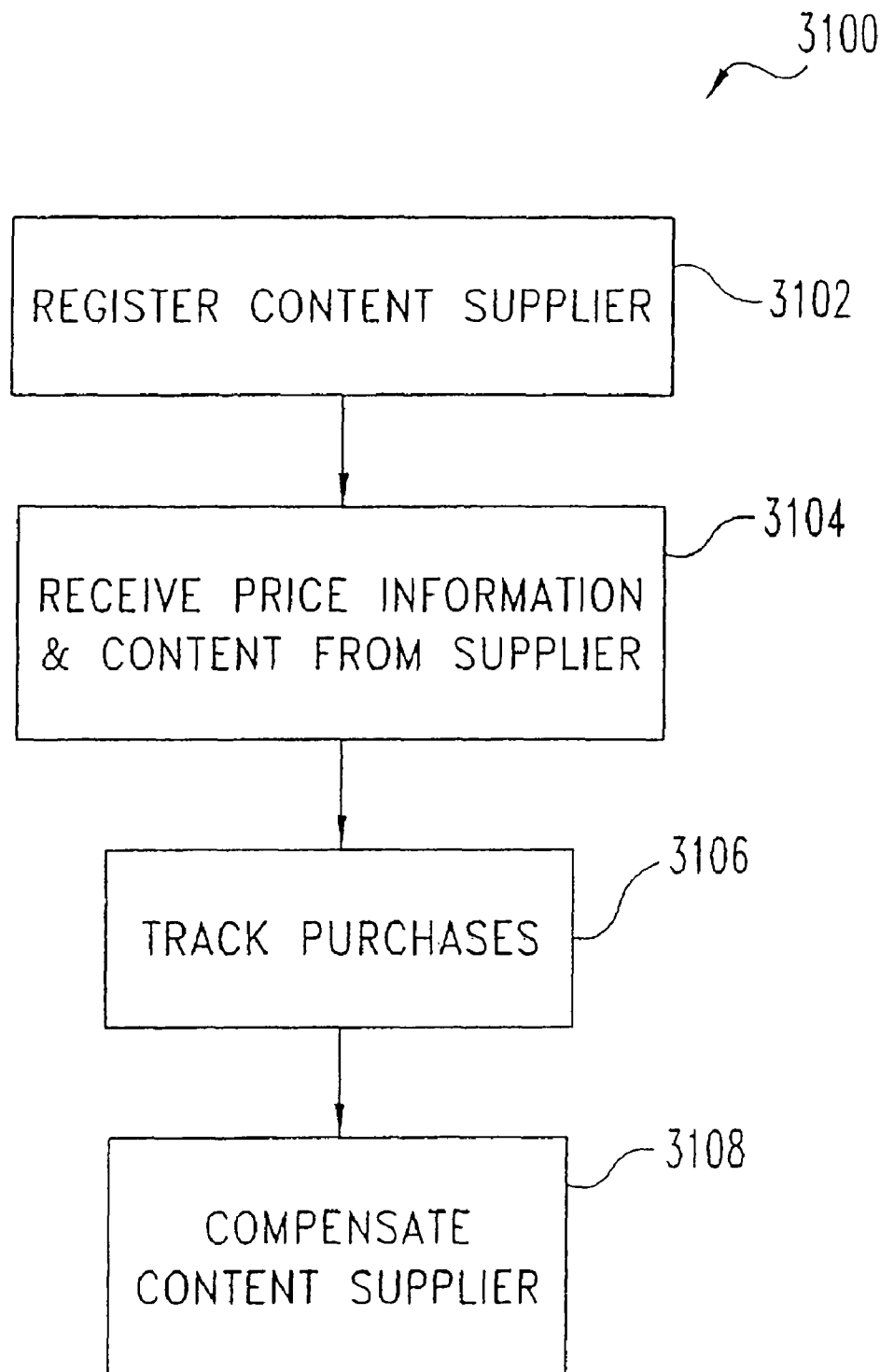


Fig. 30D

**Fig. 30E**

***Fig. 31***

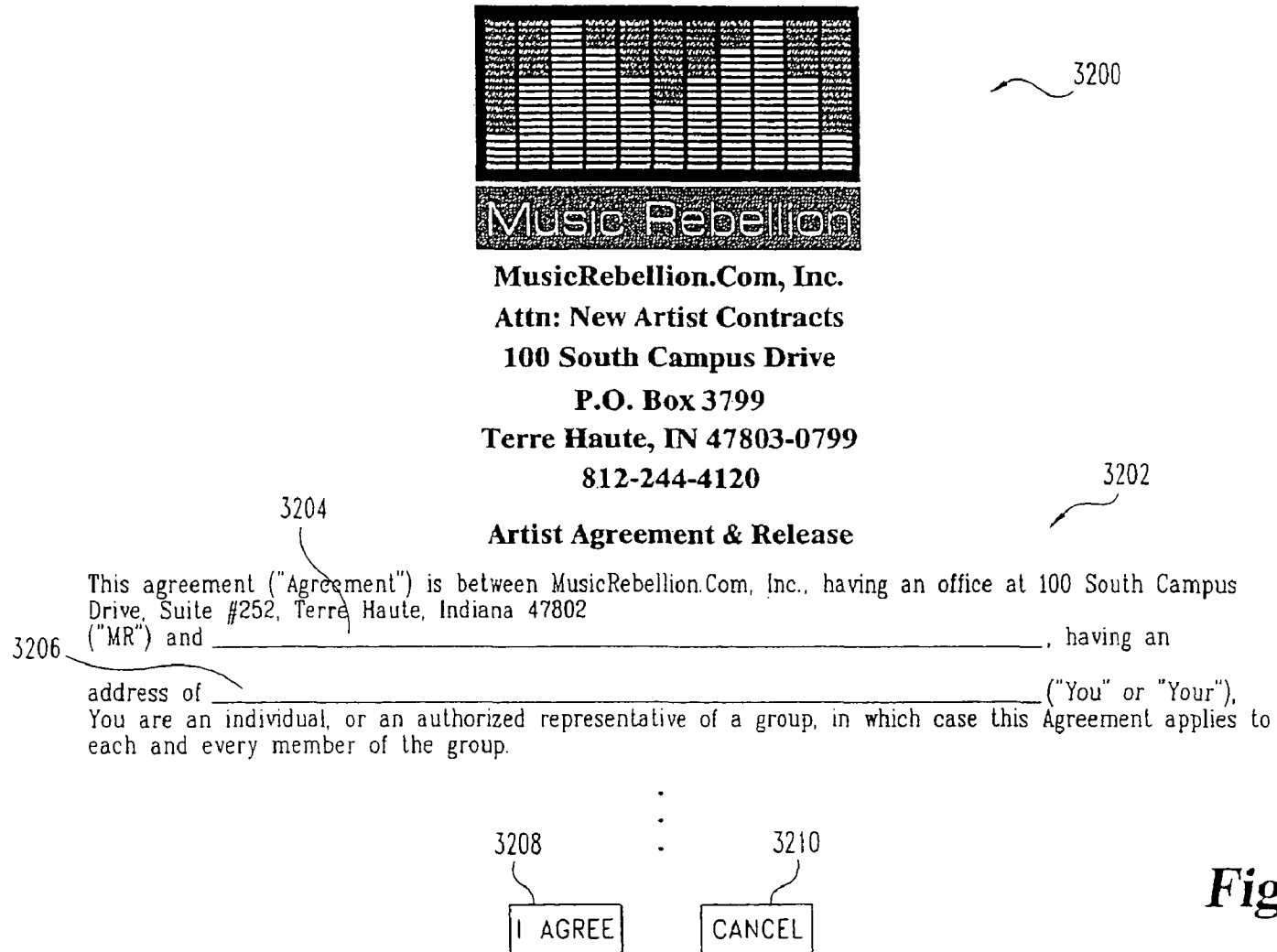


Fig. 32

3300

CONTENT PRICING & DOWNLOAD

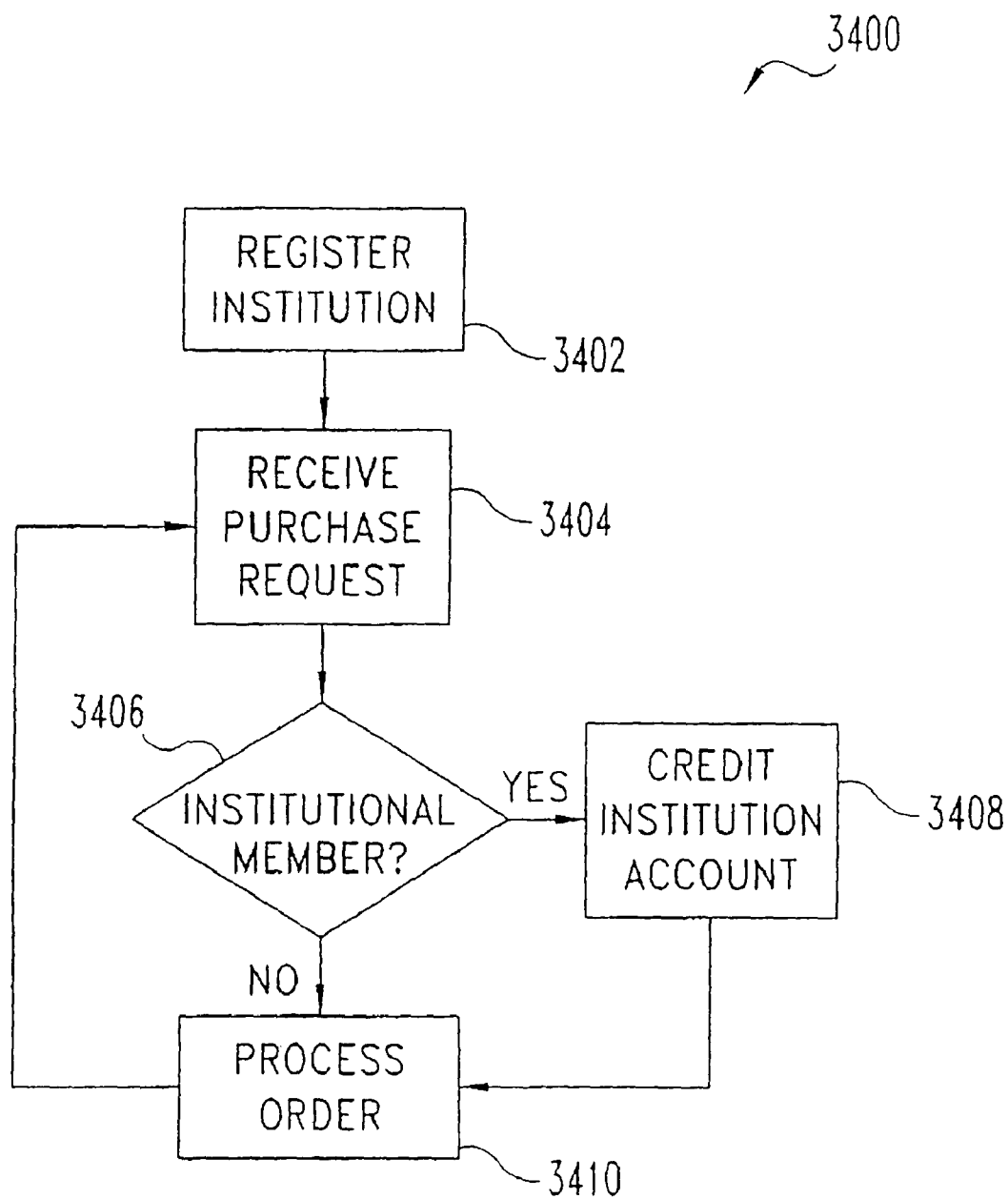
TITLE OF WORK	<input type="text"/>	3302
LENGTH OF WORK	<input type="text"/>	3304
FILE LOCATION	<input type="text"/>	3306
INITIAL PRICE	<input type="text"/>	3308
MINIMUM PRICE	<input type="text"/>	3310
MAXIMUM PRICE	<input type="text"/>	3312

3314
SUBMIT

3316
CANCEL

The diagram shows a form titled 'CONTENT PRICING & DOWNLOAD' with a reference numeral 3300. It contains six input fields for text entry, each with a label to its left and a reference numeral to its right. The fields are: 'TITLE OF WORK' (3302), 'LENGTH OF WORK' (3304), 'FILE LOCATION' (3306), 'INITIAL PRICE' (3308), 'MINIMUM PRICE' (3310), and 'MAXIMUM PRICE' (3312). Below these fields are two buttons: 'SUBMIT' (3314) and 'CANCEL' (3316).

Fig. 33

**Fig. 34**

1

DIGITAL ONLINE EXCHANGE FOR PRICING ITEMS TO EXHAUST INVENTORY BY AN EXPIRATION TIME

RELATED APPLICATIONS

The present application is a continuation-in-part of pending U.S. patent application Ser. No. 11/737,574, filed Apr. 19, 2007, which is a continuation of U.S. patent application Ser. No. 11/422,546 filed Jun. 6, 2006 which is a continuation of U.S. patent application Ser. No. 10/084,777, filed Feb. 27, 2002 (now U.S. Pat. No. 7,080,030) which claimed the benefit of commonly owned U.S. Provisional Patent Application Ser. No. 60/272,130, filed Feb. 28, 2001, and U.S. Provisional Patent Application Ser. No. 60/310,381, filed Aug. 6, 2001, all of which are hereby incorporated by reference in their entirety.

SUMMARY AND BACKGROUND

The present invention generally relates to purchasing systems, and more specifically, but not exclusively, concerns a sales system adapted to dynamically price goods and/or services over a computer network.

With the recent explosion in Internet commerce, the amount of stolen or pirated content has been on the rise. Encryption systems, such as Secured Digital Music Interface (SDMI), can be circumvented by hackers so that songs contained therein are freely available. For example, point-to-point (peer-to-peer) (P2P) programs, such as Napster and Gnutella, have made it very easy for a person to copy copyrighted material without compensating the author or artist. Consumers who download the pirated content believe that it is “free”; when in actuality they are “stealing” the author’s work. Current intellectual property laws are not comprehensive enough and have not quickly adapted to cover this developing technology. Since intellectual property rights vary internationally, enforcement of those rights across national boundaries can be difficult. Although suits against P2P providers, such as Napster, have been successful, the cost and time involved in achieving a successful result can be prohibitive. Moreover, systems like Gnutella do not require a central index server for maintaining a list of users. This decentralized approach makes it nearly impossible to shutdown such systems since there is no central operator to target for suit. Pursuing legal remedies against individual users who break copyright laws only antagonizes the public further and creates further animosity towards the recording, movie, software and publishing industries.

Due to their popularity, the P2P swapping services, like Napster and Gnutella, have dramatically increased network loads of institutions where such services are extremely popular, like colleges and universities. To combat the increased network loads, universities have denied students access to such services across their networks. Thus, these services are severely hampered in contacting an extremely desirable demographic of consumers, students.

Therefore, there has been a long-felt need for a system to provide digital media priced so that content suppliers can make a profit, and at the same time provide an incentive for consumers to purchase and not steal content.

According to one aspect of the disclosure, a dynamic pricing system for pricing items for sale by a seller which items are available in a limited quantity comprises a pricing server and various types of data stored in memory. The pricing server includes memory, a processor and a clock. One type of data stored in memory is indicative of the initial quantity of an

2

item available in a limited quantity. Another type of data stored in memory is indicative of the current remaining quantity of the item available in a limited quantity. Yet another type of data stored in memory is indicative of an expiration time at which it is desired that all of the item available in a limited quantity be sold. The processor is configured to price the item available in a limited quantity so as to deplete the inventory of the item available in a limited quantity by the expiration date based in part by accessing the memory to retrieve the data indicative of the initial quantity, the current remaining quantity and the expiration time and accessing the clock.

Other forms, embodiments, objects, features, advantages, benefits, and aspects of the present invention shall become apparent from the detailed drawings and description contained herein.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 shows a diagrammatic view of a communication system that includes a dynamic pricing system according to one embodiment of the present invention.

FIG. 2 shows a diagrammatic view of a communication system that includes a dynamic pricing system according to another embodiment of the present invention.

FIG. 3 shows a diagrammatic view of a table structure for the FIG. 2 dynamic pricing system.

FIG. 4 is a flow diagram illustrating process for dynamically pricing and providing content according to one embodiment of the present invention.

FIG. 5 shows a main display screen for the dynamic pricing system.

FIG. 6 shows a registration display screen for the dynamic pricing system.

FIG. 7 shows a user agreement display screen for the dynamic pricing system.

FIG. 8 shows a registration completed display screen for the dynamic pricing system.

FIG. 9 shows a sign-in display screen for the dynamic pricing system.

FIG. 10 shows a registered user main display screen for the dynamic pricing system.

FIG. 11 is a flow diagram illustrating a process of crediting a user account according to one embodiment of the present invention.

FIG. 12 shows a billing display screen for the dynamic pricing system.

FIG. 13 shows an update user profile display screen for the dynamic pricing system.

FIG. 14 shows a purchase history display screen for the dynamic pricing system.

FIG. 15 shows a charge credit card display screen for the dynamic pricing system.

FIG. 16 shows a search display screen for the dynamic pricing system.

FIG. 17 shows a search results display screen for the dynamic pricing system.

FIG. 18 shows a media type display screen for the dynamic pricing system.

FIG. 19 shows a music category display screen for the dynamic pricing system.

FIG. 20 shows a genre display screen for the dynamic pricing system.

FIG. 21 shows a musical artist display screen for the dynamic pricing system.

FIG. 22 shows an album display screen for the dynamic pricing system.

FIG. 23 shows a details display screen for the dynamic pricing system.

FIG. 24A shows a purchase content display screen for the dynamic pricing system.

FIG. 24B shows a download display screen for the dynamic pricing system.

FIG. 25 is a flow diagram illustrating a process for dynamically pricing an item according to one embodiment of the present invention.

FIG. 26 is a flow diagram illustrating a process for dynamically pricing an item according to another embodiment of the present invention.

FIG. 27 is a flow diagram illustrating a process for dynamically pricing an item according to a further embodiment of the present invention.

FIG. 28 shows a diagrammatic view of data flow between navigation servlets in the FIG. 2 system.

FIG. 29 shows a diagrammatic view of data flow between file servlets in the FIG. 2 system.

FIG. 30A 30E show a diagrammatic view of data flow between database servlets in the FIG. 2 system.

FIG. 31 is a flow diagram illustrating a technique for registering and compensating content suppliers according to one embodiment of the present invention.

FIG. 32 shows an artist agreement and release display screen for the dynamic pricing system.

FIG. 33 shows a content pricing and download display screen for the dynamic pricing system.

FIG. 34 is a flow diagram illustrating a technique for providing incentives in order to gain access to institutional networks according to one embodiment of the present invention.

DETAILED DESCRIPTION

For the purposes of promoting an understanding of the principles of the invention, reference will now be made to the embodiments illustrated in the drawings and specific language will be used to describe the same. It will nevertheless be understood that no limitation of the scope of the invention is thereby intended, such alterations and further modifications in the illustrated device, and such further applications of the principles of the invention as illustrated therein being contemplated as would normally occur to one skilled in the art to which the invention relates.

FIG. 1 depicts a communication system 100 according to one embodiment of the present invention in a diagrammatic form. The communication system 100 includes a dynamic pricing system 102, an administrative computer 104, a network 106, and one or more user computers/devices (clients) 108. An administrator of the dynamic pricing system manages the dynamic pricing system 102 with the administrative computer 104. As illustrated, the administrative computer 104 is operatively coupled to the dynamic pricing system 102, and the dynamic pricing system 102 is operatively coupled to the other systems through the network 106. As should be appreciated, administrative computer 104 can also be operatively coupled to system 102 through the network 106. Although only one administrative computer 104 is shown in FIG. 1, it should be understood that system 100 can include multiple administrative computers 104. The administrative computer 104 can include a personal computer, a computer terminal, a personal digital assistant (PDA) and/or other types of devices generally known to those skilled in the art. In one embodiment, administrative computer 104 is a personal computer.

The dynamic pricing system 102 stores, dynamically prices, and delivers media content items to the clients 108

over the network 106. The dynamic pricing system 102 is also operable to receive media content from the clients 108. This media content can include, but is not limited to, music, books, movies, videos, television shows, software, coupons, tickets, web pages, magazines, newspapers, and other types of electronic media. As should be appreciated from the discussion below, the dynamic pricing system 102 can be adapted to dynamically price goods and/or services, such as electronics and repair services. For instance, these goods and/or service items can include, but are not limited to, compact discs, digital versatile discs, electronic products, household products, jewelry, furniture, telephone services, and the like. It should be appreciated that such items, when purchased, can be delivered electronically over the network 106 and/or physically delivered, for example by a postal carrier. As illustrated, the dynamic pricing system 102 includes a processor 110, a clock 111 and memory 112. The dynamic pricing system 102 can be located on a single server or distributed over several servers. In one embodiment, the dynamic pricing system 102 is incorporated into one or more web servers. The processor 110 is used to control the operation of the dynamic pricing system 102. The processor 110 may be comprised of one or more components. For a multi component form of processor 110, one or more components may be located remotely relative to the others, or configured as a single unit. Furthermore, processor 110 can be embodied in a form having more than one processing unit, such as a multi-processor configuration, and should be understood to collectively refer to such configurations as well as a single-processor-based arrangement. One or more components of the processor 110 may be of electronic variety defining digital circuitry, analog circuitry, or both. Processor 110 can be of a programmable variety responsive to software instructions, a hardwired state machine, or a combination of these. The clock 111 is used to time events in the dynamic pricing system 102. As should be appreciated, the clock 111 can be incorporated into the processor 110 or can be a stand-alone component. Further, the clock 111 can be hardware and/or software based. Among its many functions, the memory 112 in conjunction with the processor 110 is used to store media content and manage sales. Memory 112 can include one or more types of solid state memory, magnetic memory, or optical memory, just to name a few. By way of nonlimiting example, the memory 112 can include solid state electronic random access memory (RAM), sequential access memory (SAM), such as first-in, first-out (FIFO) variety or last-in, first-out (LIFO) variety, programmable read only memory (PROM), electronically programmable read only memory (EPROM), or electronically erasable programmable read only memory (BEPROM); an optical disc memory (such as a DVD or CD-ROM); a magnetically encoded hard disc, floppy disc, tape, or cartridge media; or a combination of these memory types. In addition, the memory 112 may be volatile, non-volatile, or a hybrid combination of volatile, non-volatile varieties. In the illustrated embodiment, the memory 112 further includes removable memory 114. The removable memory 114 can be in the form of a non-volatile electronic memory unit, optical memory disk (such as a DVD or CD-ROM); a magnetically encoded hard disk, floppy disk, tape, or cartridge media; or a combination of these or other removable memory types.

Network 106 can include the Internet, one or more other wide area networks (WAN), a local area network (LAN), a proprietary network such as provided by America Online, Inc., an institutional network, a cable television network, a public switched telephone network (PSTN), a combination of these, and/or other types of networks generally known to those skilled in the art. In one form of the present invention,

5

the network 106 includes the Internet. In the illustrated embodiment, the network 106 further includes an institutional network 115. As should be appreciated that the network 106 can include more than one institutional network 115. The institutional network 115 is maintained by institutions, such as colleges, universities, high schools, technical schools, other types of learning institutions, and/or charitable organizations. As shown, client devices 108 are operatively coupled to the network 106. Users access the dynamic pricing system 102 through the client devices 108. The clients 108 and the dynamic pricing system 102 communicate with one another by sending signals across the network 106. In one form, these signals can include HyperText Mark Up Language (HTML) pages, Extensible Mark Up Language (XML) Page, and other types transmission protocols. For example, the dynamic pricing system 102 can send a signal corresponding to a web page form across the network 106 to the client 108. The user with client 108 can fill out the form and send a signal corresponding to the filled-out form across the network 106 to the dynamic pricing system 102. By way of non-limiting examples, the clients 108 can include personal computers, both fixed and portable; computer terminals; PDA's; cellular telephones, land line based telephones and the like; television systems, such as televisions, television-based web browsers, digital video recorders, analog video recorders, cable boxes, cable modems, direct broadcast satellite (DBS) boxes, digital versatile disc (DVD) players and video game systems; home entertainment systems, such as stereo equipment, MP3 players, and the like; sound production equipment; video/movie production equipment; or a combination these components, to name a few examples. As shown, the clients 108 are operatively coupled to the dynamic pricing system 102 over the network 106. It should be appreciated that the clients 108 can be operatively coupled to the dynamic pricing system 102 through hardwired and/or wireless connections. The clients 108 are hardwired and/or have software that allows the clients 108 to communicate over the network 106. In one embodiment, the clients 108 are personal computers with software that can include email applications, web browsers, chat programs, and/or proprietary software.

Users of the dynamic pricing system 102 can be further categorized into two types of users, mainly: content suppliers (or artists) and content consumers (or customers). For example, content suppliers can include, but are not limited to, artists, authors, directors, programmers, producers, actors, performers, publishers, movie/television studios, music labels, copyright holding organizations such as the Recording Industry Association of America (RIAA), and their agents. As should be appreciated, the same user of the dynamic pricing system 102 can be a combination of both types, such that they can take the role of being both a content supplier and consumer. As shown, the clients 108 can include one or more content supplier computers/devices 116. The content supplier computer 116 can include, but is not limited to, any of the devices that were described above for the clients 108. With content supplier computer 116, a content supplier can post media content for sale on the dynamic pricing system 102. The media content can come from a source outside of computer 116, or an artist can generate the content with the content supplier computer 116 and/or peripheral devices 118 that operatively coupled to the content supplier computer 116. These peripheral devices 118 can include, but are not limited to, electronic keyboards, digital cameras, scanners, video cameras, video production equipment, sound production equipment, PDA's, portable computers, and other types of content producing equipment. For example, in the illustrated embodiment, the artist can use a camera 120 to create

6

still photographs, movies and videos. Further, in the illustrated embodiment, the artist can create music with keyboard 122 and can create software or text with the content supplier computer 116. Although a single content supplier computer 116 is illustrated in FIG. 1, it should be appreciated that system 100 can include multiple content supplier computers 116. Content suppliers can sell individual items and/or bundle multiple items for sale on the dynamic pricing system 102. For example, the dynamic pricing system 102 can sell one song and two pictures collectively for a single price. In another example, two pictures can be bundled together and sold at a single price on the dynamic pricing system 102.

The clients 108 further include customer devices 124. It should be understood that customer devices 124 can include, but are limited to, the devices as described above for the clients 108. As shown, the customer devices 124 can further include institutional member devices 125. Institutional members, such as students and teachers, are operatively coupled to the dynamic pricing system 102 through the institutional network 115. With customer devices 124, consumers can purchase and download content from the dynamic pricing system 102. Consumers can view, listen to and/or interact with the content they purchased with customer devices 124. For example, when the customer device 124 is a personal computer, the personal computer can be used to store compressed digital media musical content, such as MP3 files. The personal computer then can be used to play, store, and/or "burn" CDs with music from the MP3 files. In the illustrated embodiment, a consumer can download a book with customer device 124 and print out the book with a printer 125 that is operatively coupled to the customer device 124. Alternatively or additionally, the consumer can download the purchased content to one or more portable devices 126. These portable devices 126 can include, but are not limited to, portable music players (such as MP3 players), PDA's, cellular telephones, portable televisions, portable computers, hand held games, e-book readers and/or a combination of these devices. As shown, the portable devices 126 can be operatively to the customer devices 124 in order to download the purchased content. The portable devices 126 can also be operatively coupled to the network 106 through a wireless network connection. For example, a portable music player 128, such as an MP3 player, can download purchased songs from the customer device 124. It should be understood that dynamic pricing system 102 is not limited to a specific file format, such as the MP3 format for music. Rather, the dynamic pricing system 102 is able to accommodate a wide range of file formats such as WAV and SDMI complaint files for musical works and ASCII and portable document format (PDF) files for text, for example. In the illustrated embodiment, a consumer with customer device 124 can download a purchased book, software program, song, and/or movie to a PDA 130. Moreover, the portable devices 126 can be operatively coupled to the network 106 in order to directly purchase and receive content from the dynamic pricing system 102. As illustrated, a wireless PDA or cellular telephone 132 can purchase and download content directly from the dynamic pricing system 102. In another example illustrated in FIG. 1, a customer can purchase dynamically priced movies or television shows with a television 134. In this example, the customer purchases the program from the dynamic pricing system 102 through the Internet, a cable system and/or a direct broadcast satellite (DBS) system (network 106). Payments for content purchased on the dynamic pricing system 102 can be handled internally and/or handled by a third party system. In one embodiment, a third party payment service 136 is used pro-

cess customer payments for downloaded content. In one form, the third party payment system 136 includes Verisign's PayFlow system.

A detailed illustration of one of many embodiments of the dynamic pricing system 102 is illustrated in FIG. 2. As shown, system 200 includes the dynamic pricing system 102 and one or more clients 108. Although not illustrated in FIG. 2, the client computer 108 in the FIG. 2 embodiment is operatively coupled to the dynamic pricing system 102 through the network 106 in the same manner as illustrated in FIG. 1. In one form, the network 106 for the FIG. 2 dynamic pricing system 102 includes the Internet. The dynamic pricing system 102 in the FIG. 2 embodiment includes one or more connection servers 202, one or more navigation servers 204, one or more heartbeat (load balancing) servers 206, one or more database servers 208, one or more file servers 210, one or more master database servers 212, and one or more master file servers 214. Although servers 202, 204, 206, 208, 210, 212 and 214 are illustrated as separate units, it should be understood that selected servers or all of the servers can be combined to form a single unit. In one form, the dynamic pricing system 102 utilizes the Linux operating system with programs coded in the JAVA language. As should be appreciated, the dynamic pricing system can use other operating systems, such as UNIX, Windows and Apple Macintosh operating systems, to name a few. Further, the software in the dynamic pricing system 102 can be programmed in other languages besides JAVA, such as C++, Visual Basic, Fortran, Pascal, CGI and PERL, to name a few.

As illustrated, the heartbeat server 206 is operatively coupled to the connection server 202, the navigation servers 204, the database servers 208, and the file servers 210 in order to monitor their load. The connection server 202 is operatively coupled to the navigation servers 204. The navigation servers 204, the database servers 208 and file servers 210 are operatively coupled to with one another. The heartbeat server 206 monitors the performance of the other servers and load balances the dynamic pricing system 102. Periodically, servers 202, 204, 208 and 210 individually send their load status information to the heartbeat server 206. With the collected status information, the heartbeat server 206 is able to load balance servers 202, 204, 208 and 210. If the heartbeat server 206 does not receive a status signal from one of the servers 202, 204, 208 or 210, the heartbeat server 206 concludes that the server is offline, or otherwise unavailable, and directs the requests to the remaining servers. For example, when one of the database servers 208 goes offline, the heartbeat server 206 can route requests to the remaining database servers 208. Each server receives load information about the other servers from the heartbeat server 206. Based on this load information, a server can send processing requests to a server with the lowest load in order to improve the operational efficiency of the dynamic pricing system 102.

The connection server 202 is operatively coupled to the clients 108 over the network 106. The connection server 202 receives and processes all requests from the clients 108. When a request is received, the connection server 202 queries the heartbeat server 206 to find an available navigation server 204 with the lowest load. The connection server 202 then forwards the request to the navigation server 204 with the lowest load. Based on the request and the load information from the heartbeat server 206, the navigation server 204 determines the appropriate database server 208 and/or file server 210 to contact in order to process the request.

The file servers 210 store the media content that is for sale on the dynamic pricing system 102. As illustrated, the file servers 210 can maintain different media types on separate

servers. For example, the file servers 210 can include one or more movie servers 216, one or more book/text servers 218, one or more music servers 220, one or more software servers 222, and one or more photograph/picture servers 224. However, it should be understood that the different media types can be stored on a single server or combined on an array of servers. In the FIG. 2 embodiment, movies, videos, shows, and the like are store on movie servers 216. As shown in the illustrated embodiment, there are three movie servers, first 216a, second 216b and 216c third movie servers. Books, poems, short stories, manuals, news articles and other types of text are stored on the books server 218. The music servers 220 store music, songs, lyrics, sound recordings and the like. In the illustrated embodiment, the music servers 220 include a first music server 220a and a second music server 220b. Software and pictures are respectively stored in the software server 222 and the photograph server 224. The master file server 214 maintains masters of the files stored on the file servers 210 and periodically updates the files stored on the file servers 210. In one form, so as to minimize the risk of corruption, the master file server 214 is offline with respect to the file server 210 and only connects to the file servers 210 when updating the files on the file servers 210.

Depending on popularity, multiple copies of the same work (file) can be stored on multiple file servers 210. Initially, a file containing the work (content) is loaded onto one of the files servers 210, which becomes the "home" file server 210 for the work. For example, during initialization of the dynamic pricing system 102, a song is loaded from the master file server 214 onto the second music server 220b, which becomes the "home" music server 220 for this particular song. As the song becomes popular, the second music server 220b can place a copy of the file containing the song onto the first music server 220a so as to optimize performance of the dynamic pricing system 102. All requests for the song are initially placed with the "home" music server 220, which is the second music server 220b in this example, and if the second, home music server 220b is unable to process a request for the song, the second music server 220b redirects the request to one of the other music servers 220 that has a copy of the song, which in this case is the first music server 220a. Since all requests for downloading of a content file are first placed with the home file server 210, the home file server 210 is able to track and record the number of times the particular content file has been purchased and downloaded. The home file server 210 also perform keeping functions by removing copies of less popular works from the other file servers 210 in order to conserve space in memory 112. Using the same example, once the song becomes less popular, the second, home music server 220b can delete the copy of the song from the first music server 220a. In one embodiment, different works can have different home file servers 210. Returning to the same example, while the second music file server 220b was the home file server 210 for the first song, the first music file server 220a can be the home file server 210 for a second, different song. In another embodiment, all of the works for a particular type of work (music, books, movies, etc.) can have one file server 210 designated as the home file server 210. For example, in this embodiment, all of the songs loaded into the dynamic pricing system 102 can have the first music file server 220a as their "home" file sever 210.

The database servers 208 store information about the content stored on the file servers 210 and information about users of the dynamic pricing system 102, both customers and artists. This information is stored in one or more databases 225 on the database servers 208, and this information can include, but is not limited to, the name/address of the "home" file

server **210** for the works; the names of the artists, authors, directors, actors and/or owners of the works; titles; publishers; producers; type of work, such as music, text or video; work category (drama, humor, rock, jazz . . .); subject; pricing information and size/length of the work. The databases **225** on the database servers **208** can be a standard file, a combination of files, a standard database program, a relational database, a SQL (Structured Query Language) database, and/or other types of data storage structures as generally known by those skilled in the art. In one embodiment, the databases are **225** on the database servers **208** are PostgreSQL databases. As should be appreciated, the databases **225** on the database servers **208** can be other types of database, such as an Oracle or Microsoft SQL Server type databases. In the illustrated embodiment, the database servers **208** have multiple databases **225** organized by content type. For example, the databases **225** can include one or more movie databases **226**; one or more book/text databases **228**; one or more music databases **230**; one or more software databases **232**; one or more photograph/picture databases **234**; one or more user databases **236**; and/or one or more artist information databases **238**. The databases **225** can be active as separate database instances on a single database server **208** or on separate database servers **208**. In the illustrated embodiment, the databases **225** are maintained on separate database servers **208**. To improve performance, the database servers **208** in one embodiment contain multiple, redundant copies of the same database **225**.

In the illustrated embodiment, the database servers **208** in FIG. **2** have three movie databases **226** stored on separate database servers **208** that contain the same information. The movies databases **226** contain information about the movies, videos and/or shows stored in the movie file servers **216**. For instance, the movies databases **226** can store the file name along with the name/address of the home movie file server **216**; file size; title; writer; director; actors; producers; writers; distributors; movie category, such as drama or action; description; comments; reviews; pricing and demand information; and/or length of the work. The books databases **228** maintain information about the text stored in the books file servers **218**. For example, the books databases **228** can store the file name along with the home book file server **218** for a work; file size; the title; author; owner; publisher; distributor; picture of the author and/or book cover; category, such as biography or mystery; description; comments; reviews; pricing and demand information; and/or size of the work. Similarly, the music databases **230** can store the file name of a song, the location of the file on the home music server **220**, song title, artist, author, producer, distributor (label), album name, album picture, picture of the artist, musical category (i.e. rock, jazz . . .), description, comments, pricing information, demand information, and/or length/size of the song along with other information relating to the song. The software databases **232** and the picture databases **234** respectively store information about the software stored on the software file servers **222** and the pictures stored on the picture file servers **224**, and this information can include file name and home file server information **210**; pricing and demand information; titles; size; category; owner and/or authorship. Information about the particular users of the dynamic pricing system **102**, both customers and artist, is maintained in the users databases **236**. The information in the users databases **236** can be used control access to the dynamic pricing system **102** and maintain billing information. Examples of such information include the username and password; first and last names; home and business addresses; email addresses; telephone numbers; session identifiers (ID's) and other session

information; and billing and account balance information, to name a few. Biographical and other types of artist information is maintained one the artists databases **238**. It should be understood that the above-described databases **225** can include additional information and/or omit certain information.

The master database server **212** maintains masters of the databases **225** stored on the database servers **208** and periodically updates the databases **225** stored on the database servers **208**. In one form, so as to minimize the risk of corruption, the master database server **212** is offline with respect to the database servers **208** and only periodically connects to the database servers **208** when updating the databases **225**.

All requests, such as a web page requests, from the client **108** (as indicated by arrow **250** in FIG. **2**) are routed to the connection server **202**. Based on load information from the heartbeat server **206**, the connection server **202** routes the request, as indicated by arrows **252** and **254**, to the navigation server **204** with the lowest load. In one embodiment, for each subsequent action by the user, the heartbeat server **206** remembers which server was previously used and routes the user to the same server. The navigation server **204** processes the requests. For instance, the navigation server **204** can query one of the databases **225**, as shown by arrow **256**, in order to process the request. The navigation server **204** selects the particular database server **208** based on the information required (i.e. information about music, books etc.) and the load information from the heartbeat server **206**. As depicted by arrow **258**, the results from the query are returned to the navigation server **204** that sent the query. Based on the results, the navigation server **204** generates a web page and sends the page to the client **108**, which is depicted by arrow **260**. In another example, the navigation server **204** processes a purchase/download request from the client by sending the requested file name to the home file server **210** for the particular file, which is indicated by arrow **262**. As depicted by arrow **264**, the file server **210** transfers the file to the client **108**.

A table structure **300** of database tables **302** in the databases **225** according to one embodiment of the present invention is illustrated in FIG. **3**. As should be appreciated, the databases **225** can have different tables **302** and/or table structures **300** than the one shown. The tables **302** in the databases **225** include a media information table **304**, a pricing table **306**, a keyword table **308**, an artist table **310**, an account table **312**, and a session table **314**. The media information table **304** stores information about the media content stored on the file servers **210**. In one embodiment, the movie **226**, books **228**, music **230**, software **232**, and photograph **234** databases each include one or more media information **304**, pricing **306** and keyword **308** tables. The media information tables **304** includes a number of fields **316** that contain information about a particular media content item. As shown, the fields **316** in the media information table **304** can include a media ID field **318** for storing a unique identifier for an item; a media name field **320**, which for example stores the name of the movie, song, program, etc.; an artist/author name field **322** in which the name of the artist is identified; and an artist ID field **324** which contains a unique identifier for individual artists on the dynamic pricing system **102**. In FIG. **3**, asterisked ("*") fields in the tables **302** are the fields by which the individual tables **302** are indexed. For instance, the media information table **304** is indexed by the media ID field **318**. Categorical information, such as the album name and/or the type of music, can be stored in field **326**. The filename, path and/or Internet Protocol (IP) address for an image related to the particular content is stored in field **328**. For example, field **328** can

11

contain the path and the file name of an image of a book or an album cover. The physical length of the item, such as the number of pages or playing time, is stored in field 330, and the file size of the item is stored in field 332. The file name and address, such as the path and/or IP address of the home file server 210, of the item is listed in field 334. The price model for dynamically pricing the item, the initial price for the item, and the implicit or marginal cost of the item are stored in fields 336, 338 and 340, respectively. Fields 342, 344 and 346 respectively store the minimum price for the item, the maximum price for the item and the current price for the item. The current demand, or the number of times the item was purchased within a specified period, is maintained in field 348. A count cache field 350 stores the number of purchases of the item since the last time the current demand was determined. Pricing algorithm parameters field 352 can store information such as the historical pricing and quantity ordered information for the item. In one form, field 352 stores the price and corresponding demand for the item over the last seven periods. It should be appreciated that depending on the dynamic pricing technique used, field 352 can store other parameters, such as the time between purchases.

The pricing table 306 stores information related to the price of particular media content items. The pricing table 306 includes media ID field 318 for identifying the particular item. The date/time, the price at that time, and the quantity demand at that time for the item identified by the media ID field 318 are stored in fields 354, 356 and 358, respectively. The keyword table 308 is used for searching and locating records of items in the databases 225 by keywords. In keyword table 308, the keywords are stored in field 360 and the media ID of the record that contains the keywords is stored in the media ID field 318. The artist table 310 is maintained in the artist database 238 and contains information about artists, authors, performers, directors, producers, and the like. The artist ID field 324 is a unique identifier for the artist. The username and artist name are respectively stored in fields 362 and 322 in table 310. A description of the artist and their work is maintained in field 364. The address to the web site for the artist is stored in field 366.

As illustrated in FIG. 3, account information for the users of the dynamic pricing system 102, both customers and suppliers, is maintained in account table 312. In one form, the account information table 312 is maintained in each user database 236. It should be appreciated that the user information in table 312 can be encrypted in order to ensure privacy. In table 312, the username and password for accessing the dynamic pricing system are maintained in fields 362 and 368, respectively. As shown, the first name and last name of the user is stored in fields 370 and 372, respectively. The street address of the user is stored in fields 374 and 376. The city, state, zip code, country, email address, and telephone number of the user are stored in fields 378, 380, 382, 384, 386 and 388, respectively. The account balance of the user is maintained in field 390. Information about user access to the dynamic pricing system 102 is maintained in the session table 314. In one form of the present invention, the session table 314 is stored in the user database 236. As should be appreciated, the session table 314 can be stored in other databases 225. The session table 314 stores a unique session ID in field 392 and the username in field 362. The date/time of the session is maintained in field 394. The tables 302 are linked to one another by various fields 316. For instance, the pricing 306 and keyword 308 tables can be linked to the media information table 304 via the media ID field 318. The session 314 and account 312 tables are linked to one another by the username field 362.

12

The artist table 310 can be linked to table 304 via the artist ID field, and the artist table 310 can be linked to the account table via the username field 362.

In another embodiment of the present invention, the dynamic pricing system 102 is configured to dynamically price P2P transactions. In this embodiment, as shown in FIG. 1, the content is stored across multiple content supplier computers 116. The content supplier registers their content for sale on the dynamic pricing system 102, and the dynamic pricing system 102 dynamically prices the content. When an item is purchased, the content supplier computer/device 116 that has the item transfers the file containing the item directly over the network 106 to the customer device 124. For example, in one form of this embodiment, the content supplier computers 116, which are remotely distributed across the network 106, act like the file servers 210 of FIG. 2; while the database servers 208 remain centrally located in the manner as illustrated in FIG. 2. Like the other embodiments, the database servers 208 track the purchases made and administer user accounts. Moreover, the databases 225 store the file names of the content items for sale along with the corresponding addresses (paths) of the content supplier computers 116 that store the file. For example, the file server field 334 in the media information table 304 of FIG. 3 can store the file name and IP address of the content supplier computer 116. As should be appreciated, the dynamic pricing system 102 according to this embodiment provides a centralized access point for conducting and administering searches. In a further form, the dynamic pricing system 102 provides a mechanism, such as keys for encrypted content, for unlocking downloaded files and certifying that the downloaded file is correct. It should be appreciated that the propagation technique for popular downloads, as described above for the file servers 210, can also be used with the content supplier computers 116 in the P2P embodiment.

A technique for dynamically pricing and providing content, according to one embodiment of the present invention, is illustrated with flow diagram 400 in FIG. 4. In stage 402, the customer with customer device 124 registers with the dynamic pricing system 102. Alternatively, if the customer has already registered with the dynamic pricing system 102, the customer can directly login to the dynamic pricing system 102. In one form, the client 108 has proprietary client software for interacting with the dynamic pricing system 102. In another form of the present invention, which is described below, the client 108 includes a web browser for interacting with the dynamic pricing system 102. The web browser allows the customer and/or artist to view web pages from the dynamic pricing system 102 and to submit forms to the dynamic pricing system 102. As should be appreciated, the customer first accesses the dynamic pricing system 102 by entering and/or selecting the domain name or the IP address of the dynamic pricing system 102 with the web browser. After accessing the dynamic pricing system, one of the navigation servers 204 sends a main web page to the client 108.

An example of a main web page 500 is illustrated in FIG. 5. It should be appreciated that the web pages described below can omit certain information and/or include information. Furthermore, although the interface describe below uses web pages, it should be appreciated that other types interfaces can be used to interact with users of the dynamic pricing system 102. For instance, a proprietary interface, a menu type interface, a voice command interface, and/or other types of interfaces as generally known by those skilled in the art can also be used. Page 500 includes a navigation toolbar 502, an advertisement portion 504, a general information portion 506, a new user button 508, a login portion 510, an account infor-

13

mation portion **511**, and a search portion **512**. With the navigation toolbar **502**, the user can navigate between the various web pages of the dynamic pricing system **102**. As illustrated, the navigation tool bar **502** includes a welcome button **514**, a new user account button **516**, an account button **518**, a sign in button **520**, an artist registration button **522**, a frequently asked question (FAQ) button **524**, a view media button **526**, a music button **528**, a video button **530**, a photograph button **532**, a book button **534**, a programs button **536**, an advanced search button **538** and an about button **540**. Selecting the welcome button **514** causes the main web page **500** to appear on the client **108**. As shown in FIG. 5, page pointer **541** is positioned next to the welcome button **514** so as to indicate that the user is currently on the main web page **500**. The user of the dynamic pricing system can create a new user account by selecting either the new user account button **516** or the new account button **508**, and can edit their account information by selecting the account button **518**. The sign in button **520** allows the user to sign into the dynamic pricing system **102**. With the artist registration button **522**, a content supplier, such as an artist, can register with and/or receive information on how to register as a content supplier on the dynamic pricing system **102**. A user can receive answers to questions by selecting the FAQ button **524**. A customer can select the view media button **526** in order to view the different categories of media content (music, movies, etc.) that are available on the dynamic pricing system **102**. Alternatively, the user can directly access the music, videos/movies, photographs, text/book and software category screens, which list the content available, by selecting the music button **528**, the video button **530**, the photograph button **532**, the book button **534** and the program button **536**, respectively. The user can search for content on the dynamic pricing system **102** by selecting the advanced search button **538**, and the user can retrieve general information about the dynamic pricing system, such as contact information, by selecting the about button **540**.

Content suppliers on the dynamic pricing system **102** can advertise their work in the advertisement portion **504** of the main web page **500**. It should be appreciated that other types of advertisements can be displayed in the advertisement portion **504**. General information portion **506** displays general information about the dynamic pricing system **102**, such as operational status information and how to use the dynamic pricing system **102**. As mentioned above, a new user of the dynamic pricing system **102** can register with the system **102** by either selecting the new account button **508** or the new user button **516**. After selecting either button **508** or **516**, the dynamic pricing system **102** sends to the client **108** a registration form **600** (FIG. 6). As illustrated, the registration form **600** includes a registration status portion **602** that indicates the steps required to register with the dynamic pricing system **102** and an information entry portion **604** in which user information is entered. The entry portion **604** includes a username field **606** in which the user can type in a username and one or more password fields **608** in which the user enters (and re-enters) password information. In entry portion **604**, the user can enter their first name, last name, street address, city, state, zip code, country, email address and telephone number into fields **610**, **612**, **614**, **616**, **618**, **620**, **622**, **624** and **626**, respectively. After the information is entered into entry portion **604**, the user can submit the registration form **600** to the dynamic pricing system **102** by selecting a next button **628**. As should be appreciated, the client **108** (through applets in the form) and/or the dynamic pricing system **102** can check for errors (and/or missing information) in the registration form **600**. If the registration form **600** was not properly filled out, the

14

dynamic pricing system **102** and/or client **108** can ask that the information be corrected and resubmitted.

After the registration form **600** is submitted, the dynamic pricing system **102** sends a user agreement form **700** to the client **108**. As shown in FIG. 7, the user agreement form **700** includes an agreement text portion **702** in which the text of the agreement is displayed and an assent button **704**. The user agrees to the terms of the user agreement by selecting the assent button **704**. The user information is then stored in the user database **236**, and a registration completion form **800**, which is illustrated in FIG. 8, is displayed on the client **108**. Subsequently, a user can access the dynamic pricing system **102** by manually logging onto the dynamic pricing system **102**. The user can also be automatically logged onto the dynamic pricing system **102** with a user identifier, such as a "cookie", that is stored on the client **108**. Referring again to FIG. 5, the user can enter their username and password in fields **542** and **544**, respectively, and select sign in button **546** to log into the dynamic pricing system **102**. Alternatively, the user can select the sign in button **520** on the navigation tool bar **502** in order to be shown a sign in form **900**, which is illustrated in FIG. 9. The user can then enter their account information into fields **542** and **544**, and select the sign in button **546** to log into the dynamic pricing system **102**.

After logging into the dynamic pricing system **102**, the user is shown a registered user main page **1000**, which is depicted in FIG. 10. As shown, the registered user main page **1000** contains similar portions and buttons as shown in the main page **500** of FIG. 5, with the exception that the registered user main page **1000** does not have the login portion **510** and the account information portion **511** lists the particular account information of the current user. In the illustrated embodiment, the account information portion **511** includes a username identifier **1002**, which identifies the current user, and an account balance **1004**, which indicates the amount of money the current user has in their the dynamic pricing system account.

Initially, when the user registers with the dynamic pricing system **102** their account balance **1004**, which is stored in field **390** of the account table **312**, is zero-dollars (\$0.00). Although dollars are used when describing the account balance **1004** of the user in one embodiment, it should be appreciated that different currencies can be used in the account balance **1004**, such as the Euro and the yen. With a zero (\$0.00) account balance **1004**, the user can still use the dynamic pricing system **102**. For example, an artist does not need money in order to supply content to the dynamic pricing system **102**. In another example, even with a zero account balance, a customer can download free content from the dynamic pricing system **102**. In the illustrated embodiment, a customer pre-deposits money into an account from which their purchases are deducted. By pre-depositing money into an account, purchases on system **102** occur quickly and the purchasing experience for the user is similar to the "free" systems, such as the Gnutella. The customer can add money to their account in a number of ways including, but not limited to: payments through credit or debit cards; wire transfers; being billed; sending cash, checks or money orders to administrator of the dynamic pricing system **102**; and/or transacting payments through the third party payment service **136**, such as Verisign's PayFlow system or PayPal.com's system, to name a few. In another embodiment, a customer does not maintain an account balance, but rather pays for each individual purchase at the time of the purchase.

A flow diagram **1100** for illustrating one technique for adding money to an account in the dynamic pricing system **102** according to one embodiment of the present invention is

15

shown in FIG. 11. In stage 1102, the dynamic pricing system 102 sends to the client 108 one or more forms for crediting the account of the customer. To add money, the customer selects the my account button 518 on the navigation tool bar 502. In response, the dynamic pricing system 102 sends to the client 108 a billing form 1200 (FIG. 12). Form 1200 includes a my account tool bar 1202 and an add new card button 1204. The my account tool bar 1202 allows the user to navigate through a number of forms related to their account. The my account tool bar 1202 includes a profile form link 1206, a purchases form link 1208, and a billing form link 1210. With the profile link form 1206, the user can edit their account profile information. As illustrated in FIG. 13, the account profile form 1300 contains many of the fields shown in form 600 (FIG. 6) for entering user information, including fields 610, 612, 614, 616, 618, 620, 622, 624 and 626. The account profile form 1300 further includes the my account tool bar 1202, a save button 1302 for saving any changes to the user database 236 and a cancel button 1304 for not saving the changes. With the purchases form link 1208, the user can view their past purchases on purchase history form 1400 (FIG. 14). The purchase history form 1400 includes a list 1402 of past purchases. This list 1402 can include date of purchase 1404, title of content 1406 and price paid for the content 1408.

The billing form 1200 (FIG. 12) is shown on the client 108 when the billing form link 1210 is selected on the my account tool bar 1202. On the billing form 1200, the user can add money to their account by selecting the add new card button 1204. In response, the dynamic pricing system 102 sends to the client 108 a charge form 1500 (FIG. 15) in which the user can add money to their account by charging a credit card. As should be appreciated, a secure socket layer (SSL) can be used on the client 108 for authentication purposes and to encrypt the credit card information sent over the network 106. As shown, the charge form 1500 contains fields 1502 for charging money to a credit card. To charge the credit card, the user enters their first name, last name, street address, city, state, zip code, country, credit card type, credit card number, expiration date, amount to charge, email address and telephone number in fields 1504, 1506, 1508, 1510, 1512, 1514, 1516, 1518, 1520, 1522, 1524, 1526 and 1528, respectively. In the charge field 1524, the user enters the amount to add to their account balance, which is to be charged to the credit card. To charge the amount in the charge field 1524 to the credit card, the user selects save button 1530, which submits the information entered in form 1500 to the dynamic pricing system 102.

In the embodiment illustrated in FIG. 1, the dynamic pricing system 102 incorporates client software from the third party payment system 136 that handles the transactions for crediting money to the account of the user. In one form, the third party payment system 136 is VeriSign's PayFlow system and the third party client software is VeriSign's PayFlow client software. As should be appreciated, other types of third party payment systems 136 can be used.

In stage 1104 (FIG. 11), the dynamic pricing system 102 receives the credit card billing information from the client 108, and in stage 1106, the dynamic pricing system 102 through the third party client software forwards the billing information to the third party payment system 136, which administers the transaction. The third party payment system 136 collects the transaction information from the dynamic pricing system 102 and then securely routes the transaction via a gateway through a financial network to the appropriate bank, ensuring that user is authorized to make the purchase. The third party client software in the dynamic pricing system 102 also sends an acknowledgement back to the third party

16

payment service 136 after returning the payment results to the dynamic pricing system 102, in order to protect the user against double billing due to latency or broken communication sessions. It should be understood that the dynamic pricing system 102 can send an error message to the client 108, when the dynamic pricing system cannot charge the credit card (i.e., not authorized to charge the credit card or insufficient funds on the card). When the transaction is authorized, the dynamic pricing system 102 in stage 1108 updates the account balance information stored in the user database 236 by adding the amount from the charge field 1524 to the account balance field 390 of table 312 (FIG. 3). On the third party payment system 136, the funds for the transaction are transferred to an account for the dynamic pricing system 102. In another embodiment, the dynamic pricing system 102 directly processes the transaction without using the third party payment system 136.

In stage 404 (FIG. 4), the user can search for content of interest in the dynamic pricing system 102. To perform an advance search for content, the user can select the advance search button 538 on the navigation toolbar 502. As shown in FIG. 16, in response to the selection of the advanced search button 538, the dynamic pricing system 102 sends an advanced search form 1600 to the client 108. The advanced search form 1600 includes the simple search portion 512 in which the user can perform simple searches for content. The simple search portion 512 includes a simple term entry field 1602, a media type drop-down list 1604, and a simple search button 1606. The user enters one or more search terms into the simple term entry field 1602 and selects the media type to search (i.e. movies, books, and music) with the media type drop-down list 1604. To submit the search to the dynamic pricing system 102, the user selects search button 1606. Advanced search form 1600 further includes an advanced search portion 1608 in which advanced searches can be created. The advanced search portion 1608 includes a search all field 1610, a media type field 1612, a genre field 1614, "specific field" search field(s) 1616, a maximum results drop-down list 1618, a maximum amount field 1620, released after date drop-down lists 1622, released before date drop-down lists 1624, a sort drop-down list 1626, and an advanced search button 1628. It should be understood that form 1600 can omit certain search criteria fields and/or include additional search criteria fields. In field 1610, the user can enter one or more search terms that are searched throughout every field of the database 225. The user can specify the media type and genre in drop-down lists 1612 and 1614, respectively. The user can search for terms in specified fields, such as by title, with portion 1616. The maximum number of search results can be specified in drop-down list 1618, and the maximum price for the content can be specified in field 1620. The content can be searched by release dates of the content with drop down lists 1622 and 1624. The user can specify how the search results are sorted. The user submits the advanced search to the dynamic pricing system 102 by selecting search button 1628. Based on the search criteria specified, the dynamic pricing system 102 queries the databases 225 stored in memory 112.

An example of a search results page 1700 is illustrated in FIG. 17. As illustrated, the search results page 1700 includes a modify search portion 1702 and a results portion 1704. With the modify search portion 1702, the user can submit another search to the dynamic pricing system 102. Portion 1702 has a search term field 1706 in which search terms are entered, a media type drop down list 1708 in which the type of media to be searched is entered, and a search button 1710 for submitting the search. The results portion 1704 of the search results page 1700 displays the results from the submitted search.

17

Each row/record **1712** of the results portion **1704** contains information about an item, in this example a book, that matched the search criteria. As shown, each record **1704** in the results portion **1704** can display an image **1714**, a title **1716**, author **1718**, file size **1720**, and length **1722** of the work. In the illustrated example, image **1714** contains an image of the cover of the book, and length **1722** lists the number of pages the book contains. The results portion **1704** further contains a title header **1724** that allows the user to sort the records **1712** by title when selected and an author header **1726** that allows the user to sort the records **1712** by author when selected. The user can view additional details about the work by selecting a details link **1728** for the record **1712**, and the user can preview the work by selecting a preview link **1730** for the record **1712**. The content listed in the record **1720** can be bought by selecting buy link **1732**. As shown, buy link **1732** lists a current dynamic price of the content. By selecting link **1734**, the user can purchase and download the work.

In addition, customers of the dynamic pricing system **102** can browse through hierarchical categories by selecting the view media button **526**. In response to the selection of the view media button **526**, the dynamic pricing system **102** sends to the client **108** a media types page **1800**, which is shown in FIG. **18**. As illustrated, the media types page **1800** includes a music page link **1802**, a text page link **1804**, a videos page link **1806**, a photograph page link **1808** and a software page link **1810** that respectively link to a music page, a text page, a video/movie page, a photograph page and a software page. Alternatively, the user can directly access the music page, the video/movie page, the photograph page, the text page and the software page by selecting the music button **528**, the videos button **530**, the photographs button **532**, the books button **534** and the programs button **536**, respectively. It should be appreciated that the user can access other types of media content using a similar interface.

For example, when either the music page link **1802** or the music button **528** is selected, the client **108** displays music page **1900**. As shown in FIG. **19**, the music page **1900** includes links **1902** that are organized by musical genre, such as "jazz", "funk" and "rock", to name a few. Selecting one of the links **1902** will cause the client **108** to display a page organized specifically for the selected musical genre. For instance, if jazz link **1904** is selected, the dynamic pricing system **102** will query the music databases **230** in order to generate a genre page **2000** on the client **108**. In FIG. **20**, the genre page **2000** contains musical artist links **2002** that allow the user to browse the musical works that are available for sale from the listed artists. When one of the musical artist links **2002** is selected, the dynamic pricing system **102** sends to the client **108** a musical artist page **2100**, which is shown in FIG. **21**. In the illustrated embodiment, the artist page **2100** contains a name **2102** of the artist and album links **2104** that list the albums available from that artist. When the customer selects one of the album links **2104**, the client **108** displays to the customer an album page **2200** (FIG. **22**) that includes album (or CD) name **2202** and song links **2204** for songs on that album.

As depicted in FIG. **23**, a details page **2300** for a song is displayed on the client **108** when the link **2204** for the song is selected. The details page **2300** can also be accessed by selecting the details link **1728** in the search results page **1700** (FIG. **17**). As illustrated in FIG. **23**, the details page **2300** includes: a type portion **2302** in which the type of content, in this case "music", is displayed; a title portion **2304** in which the title of the media content is listed, which in this example is the song title; and an artist name portion **2306** in which the

18

name of the artist is listed. The genre, such as jazz, for the content (song) is displayed in genre portion **2308**, and any comments concerning the content are displayed in comments portion **2310**. The file size for the content is displayed in size portion **2312**, and the length of the content is displayed in length portion **2314**. In the illustrated embodiment, the file size portion **2312** displays the file size of the song in megabytes (MB), and the length portion **2314** lists the length of the song in minutes. The details page **2300** can further include an image **2316** for the content, such as a picture of the album cover. The label for the album is displayed in label portion **2318**. The other content type pages (i.e., the text page, the video/movie page, the photograph, and the software page) contain similar hierarchical page formats for accessing content.

To receive a dynamic price for the content listed in the details page **2300**, the customer selects buy link **2320**. In the illustrated embodiment, the customer receives a dynamic price for the song by selecting buy link **2320**, which sends a signal to the dynamic pricing system **102** that indicates that the customer wants the current dynamic price for the song. In response to receipt of this signal, the dynamic pricing system **102** in stage **406** (FIG. **4**) supplies a dynamic price for the song and generates a purchase window **2400** on the client **108** that lists the current, dynamic price for the song. Purchase window **2400** is also generated when the user selects the buy link **1732** in the search results page **1700** (FIG. **17**). As illustrated in FIG. **24A**, the purchase window **2400** includes a message portion **2402** with a dynamic price **2404** for the song, a purchase button **2406** in order to purchase the song, and a cancel button **2408** to not purchase the song. In the illustrated embodiment, the customer is given a specified time window to purchase the song. After the period elapses, the purchase window **2400** automatically closes. The purchase window **2400** can also be closed by selecting the cancel button **2408**. In another embodiment, the dynamic pricing system **102** periodically refreshes the price **2404** in the purchase window **2400**. The price **2404** for a particular item, such as the song shown, and/or for a group of items is generated and dynamically adjusted by server **102**. In one embodiment, the price is adjusted based on demand for the item so as to maximize profit. Generally, the greater demand for the particular item, server **102** will increase the price until the profit is maximized, and when the demand for the item is lower, the dynamic pricing system **102** lowers the price until the profit is maximized. The price of a song can also be dynamically adjusted based on other factors such as the amount of transfer time, the length of the song and overall quality of the song, to name a few factors. When the purchase button **2406** is selected, the dynamic pricing system **102** deducts the purchase price **2404** from the account of the user (see field **390**) and the purchased item is transferred from the dynamic pricing system **102** to the customer device **124** over the network **106** in stage **408**. When the user does not have enough money in their account, the dynamic pricing system **102** requests the user to deposit additional funds into their account before downloading the item. In one embodiment, the hypertext transfer protocol (HTTP) is used to download the item from the dynamic pricing system **102**. In another embodiment, the file transfer protocol (FTP) is used to download the item from the dynamic pricing system **102** to the client **108**. As should be appreciated, items can be downloaded in other manners and using other types of protocols. For example, in the above-described P2P embodiment of the dynamic pricing system **102**, the purchased item is transferred over the network **106** directly from the content supplier computer **116** to the customer device **124**. During downloading, screen **2400** is changed to downloading screen **2400a** (FIG. **24B**), which indicates the download status of the item. Screen **2400a** con-

19

tains a message portion 2452 that displays the status of the download and a close button 2454 for closing screen 2400a. After the item is successfully downloaded, message 2452 indicates that the download process is complete. If the download is unsuccessful, message 2452 indicates that the download was not completed, and the dynamic pricing system 102 gives the customer a certain amount of time, such as two days, from the purchase to download the item without being charged again for the item.

As should be appreciated, customers can access and purchase items on the dynamic pricing system 102 using other types of interfaces. For example, when the client 108 is a telephone, the customer can access and purchase items on the dynamic pricing system 102 through an automated voice menu system (i.e. "The price is 33 cents. You have 1 minute to press 1 to confirm your order or press 0 to cancel."). When for example customers use portable devices 126, a wireless protocol, such as Wireless Application Protocol (WAP), can be used to interface with system 102.

Below a number of techniques for dynamically pricing items on the dynamic pricing system 102 will be described. The dynamic pricing system 102 tries to optimize profit; this typically involves some estimation of the demand curve(s) for the items. The dynamic pricing system 102 in dynamically pricing the media content actually never knows the demand curve for an item for sale. Generally, the dynamic pricing system 102 continues to raise the price for an item until total profits are reduced. Alternatively, system 102 will decrease the price of content whenever an increase in price reduces profits. A general description of one embodiment of the pricing algorithm will now be described below. In this embodiment, the dynamic pricing system 102 through processor 110 calculates price adjustments using a logarithmic demand curve that has been found in empirical econometric studies to be the best fitting of algebraically tractable functional form for many retail markets. The quantity of a particular item (q) purchased at a particular price (p) is assumed to take the form of equation 1 below:

$$\text{Log } [q] = \alpha - \beta p \quad (\text{Equation 1})$$

where

Log [] is a natural logarithm;
q=quantity of an item;
p=Price of the item; and
 β , α =parameters.

With Equation 1 above, parameters α and β are unknown. In order to solve these parameters, the technique according to the present invention uses data observed through sales of items to estimate these parameters. Another factor in determining the optimal price for an item is that the demand curve for an item will change over time. Therefore, in one embodiment, the dynamic pricing system 102 does not base its price upon very old data. Still yet another obstacle the dynamic pricing system 102 faces in determining pricing for a particular item is that customer demand at the time periods in which a particular item is demanded varies depending on the nature of a particular item. For example, a hit song may have may sell a thousand copies a day. However, an obscure or old song to reach that level of sales may take a week, months, and/or even years. The profit (profit_t) made in a particular time period (T) is described below in equation 2:

$$\text{profit}_t = q_t(P_t - c) \quad (\text{Equation 2})$$

where

t=time period;
profit_t=profit for a particular item at time period t;
q_t=quantity of items sold time period t;
P_t=price of the item at time period t; and
c=marginal cost.

It should be noted that for this embodiment the fixed costs such as cost of the servers, employees and other resources are

20

ignored in Equation 2. Equation 2 only considers the marginal cost (c) caused by changes in sales volumes for a particular item. However, it should be understood that in other embodiments fixed costs can be a factor for dynamically pricing an item. Other factors may be incorporated into Equation 2 in order to determine the optimal profit. For example, if the time period (t) was twelve-hours (12 hours), one would expect that more sales would occur during the day as opposed during the middle of the night. This situation could result in undesirable, dramatic price fluctuations. To compensate for the difference between the periods, Equation 2 can factor in one or more additional variables in order to stabilize prices. Alternatively or additionally, the length of the time periods can vary in order to compensate for the differences between the periods. In another form, the price fluctuations between day and night are left alone so that users are given an incentive to download content when system activity is lower.

With the above background, an example will now be used to describe how prices are dynamically adjusted according to one embodiment of the present invention. In an initial time period (t=1), an initial price for an item is set. For example, the initial price of a song could be set to 90 (\$0.90), depending on whatever the content supplier and/or the administrator using second time period (t=2), the processor 110 of the dynamic pricing system 102 changes the price in order to get a sample of the change in client demand at a differing price levels. In the current example, the price of a particular song is raised by 10¢, which is shown in equation 3 below.

$$p_2 = p_1 + 0.10p_1 \text{ (or } p_2 = p_1 \times 1.0) \quad (\text{Equation 3})$$

where

p₂=price in the second time period.

Flow diagram 2500 in FIG. 25 illustrates this technique according to one embodiment of the present invention. The technique described below will be for a song, but as should be understood this technique can be applied to the other types of media content items on the dynamic pricing system 102. In stage 2502, the initial price (p₁) of a song for sale is set by the dynamic pricing system 102 and displayed to the customer device 124. One or more orders for the song are received by the dynamic pricing system 102 in stage 2504, and the dynamic pricing system 102 stores in memory 112 the price (p₁) and quantity ordered (q₁) for the first time period. The length of the time periods in this embodiment can for example be by second, by minute, hourly, daily, weekly, monthly, yearly, or some other time increment (i.e., every 33.5 seconds). In one form, the time interval for each period is one day. For instance, the first time period would be day 1, the second time period would be day 2 and the third time period would be day 3. After the first time period, the processor 110 of the dynamic pricing system 102 in stage 2506 sets a second price (p₂) for the song and supplies the second price (p₂) for the song to the customer devices 124 (see, Equation 3). The processor 110 in stage 2506 can either increase or decrease the price of the song. For explanation purposes, we will assume that the dynamic pricing system 102 increased the price in stage 2506. In stage 2508, the dynamic pricing system 102 receives a quantity of orders (q₂) for the song from the customer devices 124. In time period three (t=3), the price and quantity ordered information from the previous two periods is used to determine whether the price change from the first period to the second period increased profits or not. If profits increased (q₂(p₂-c) > q₁(p₁-c)) then increasing prices further may be profitable. If profit decreases, however, then a price decrease from initial price (p₁) may be appropriate. The changes in prices depend on the functional form of the particular demand curve for the particular content for sale. Using

21

a logarithmic demand curve, Equation 4, which is shown below, can be used to calculate profit.

$$\text{profit} = q(p-c) - \text{Exp}(\alpha - \beta p)(p-c) \quad (\text{Equation 4})$$

From Equation 4, the profit maximizing price can be determined to be as shown below in Equation 5.

$$p = \frac{(1+c)}{\beta} \quad (\text{Equation 5})$$

A nice property of Equation 5 is that price is not dependent upon unknown parameter α . However, the optimal price still depends on unknown parameter β . As should be appreciated, a number of techniques can be used to estimate the parameters β . In one technique, the two observations of price (p) and quantity (q) are combined from periods one and two to generate an estimate of β . Equations 6 and 7 illustrate this technique.

$$\text{Log } [q_1] = \alpha - \beta p_1 + \epsilon_1 \quad (\text{Equation 6})$$

$$\text{Log } [q_2] = \alpha - \beta p_2 + \epsilon_2 \quad (\text{Equation 7})$$

Where ϵ_1 and ϵ_2 =sampling error.

Equations 6 and 7 can be combined in order to determine parameter β , which is shown below in Equation 8.

$$\beta = \{\text{Log } [q_2] - \text{Log } [q_1] - \epsilon_2 + \epsilon_1\} / (p_1 - p_2) \quad (\text{Equation 8})$$

It is assumed that the longer interval time between price changes, the smaller expected sampling error (ϵ_2, ϵ_1) would be relative to the quantities ordered. Over a long period of time, the expected sampling error terms would be zero. This yields equation 9 below.

$$\beta = \frac{\{\text{Log}[q_2] - \text{Log}[q_1]\}}{(p_1 - p_2)} \quad (\text{Equation 9})$$

The profit maximizing, or optimal price, can be determined by combining Equation 5 with Equation 9, which yields Equation 10 below.

$$p_{t-1,opt} = \frac{(1+c)(p_{t-2} - p_{t-1})}{\{\text{Log}[q_{t-1}] - \text{Log}[q_{t-2}]\}} \quad (\text{Equation 10})$$

In order to prevent extreme fluctuations in pricing between two periods, the change in pricing between two different periods is dampened so that wild fluctuations in pricing does not occur. The amount of dampening can be adjusted depending on the amount of aggressiveness in pricing the content supplier and/or administrator intends to use. The estimation of β is highly subject to sampling error. Therefore, to be conservative, a geometric mean between the previous price and the new estimated optimal price is taken. In addition, absolute bounds on how much a price adjustment between two periods is further set to further dampen pricing. This is done just in case the estimation procedure gives an inaccurate estimate. A generic form of this technique used by the dynamic pricing system **102** is shown in Equation Set 11 below.

Set

$$p_t = p_{t-1} - L \text{ if } p_{t-1,opt} < p_{t-1} - L$$

$$p_t = (p_{t-1})^w (p_{t-1,opt})^{(1-w)} \text{ if } p_{t-1} - L \leq p_{t-1,opt} \leq p_{t-1} + L$$

$$p_t = p_{t-1} + L \text{ if } p_{t-1,opt} > p_{t-1} + L$$

$$(\text{Equation Set 11})$$

22

Where

L=limit bounds, and

W=weighting factor.

Limit bounds (L) in Equation Set 11 is used to limit how much the price will be adjusted between two periods. For example, if the optimal price for the previous time period is greater than the limit bounds (L) from the actual price, then the dynamic pricing system **102** sets the price for the current time period (p_t) to the limit bound (L) from the previous time period price (p_{t-1}). Weighting factor (W) is used as a geometric mean of weighting the different prices between the optimal and the actual pricing. For example, the weighting factor is used when the optimal price for the previous time period ($p_{t-1,opt}$) is within the limit bounds (L). The geometric mean of the weighting factor (W) allows the price to move in the direction of the estimated optimal price ($p_{t-1,opt}$), but forces the price to move slowly. Aggressiveness in price adjustments can be adjusted by adjusting the weighting factor W. The more comfortable the administrator and/or content supplier are with the pricing estimates, the more aggressive the pricing can become by adjusting weighting factor W.

For example, at time period one, the dynamic pricing system **102** priced the song at \$1.00 (p_1 =\$1.00) and the number of copies of the song that were purchased during time period one was 150 (q_1 =150). During time period two, the dynamic pricing system **102** priced the same song at \$1.40 (p_2 =\$1.40) and the number of copies of the song that were purchased during time period two was 100 (q_2 =100). In time period three, the dynamic pricing system **102** determines the optimal price to be the following in Equation 12 (stage **2510**). In Equation 12, we have assumed the marginal cost of supplying an additional copy to be negligible, or zero ($c=0$) for this example.

$$p_{2,opt} = \frac{(1+c)(p_1 - p_2)}{\{\text{Log}[q_2] - \text{Log}[q_1]\}} \quad (\text{Equation 12})$$

$$p_{2,opt} = \frac{(1+0)(1.00 - 1.40)}{\{\text{Log}[100] - \text{Log}[150]\}} = 0.99$$

With the bounds equals \$0.50 (L) and weighting factor W=0.8 in this example, the dynamic pricing system **102** uses Equation Set 13 below in order to determine the dynamic price at time period three (p_3).

Set

$$p_3 = p_2 - 0.50 \text{ if } p_{2,opt} < p_2 - 0.50$$

$$p_3 = (p_2)^{0.8} (p_{2,opt})^{0.2} \text{ if } p_2 - 0.50 \leq p_{2,opt} \leq p_2 + 0.50$$

$$p_3 = p_2 + 0.50 \text{ if } p_{2,opt} > p_2 + 0.50$$

$$p_3 = (1.40)^{(0.8)} (0.99)^{(0.2)} = \$1.31 \quad (\text{Equation Set 13})$$

In stage **2510**, the dynamic pricing system **102** with processor **110** sets the revised sale price for the item and stores the price in memory **110**. Using the above example, the dynamic pricing system **102** would then set the price of the song to \$1.31 in time period three. For subsequent time periods, as more orders are received in stage **2508**, the dynamic pricing system **102** continues to periodically re-price the content according to the Equation Set 11.

Equation 14 below is a generic form for another technique of dynamically pricing an item according another embodiment of the present invention.

$$\text{New Dynamic price} = \text{Price Basis} \times \text{Dynamic Price Modifier}$$

$$(\text{Equation 14})$$

23

In Equation 14, the price basis is modified by the dynamic price modifier so as to result in a new dynamic price for an item. In one form, the dynamic price modifier is some measure of change in demand for one or more items being priced. In another form, the dynamic price modifier can take into account profitability of different price levels. It should be understood that the dynamic pricing modifier can take into account other factors. These factors can include, but are not limited to: the marginal and/or fixed costs of the item; price ceilings and/or floors for the item; file size of the item; the bandwidth of the connection to the dynamic pricing system **102**; the quality of the item; the popularity of the item as measured by third parties, such as the Billboard ranking of a song; reviews of an item; and number of times an item has been viewed on the dynamic pricing system **102**. Generally, the dynamic price modifier increases the price of an item when demand for that item increases and reduces the price of an item when the demand for the item decreases. In one form, the dynamic pricing modifier is based on the differences between the quantity ordered at specific intervals. For instance, these intervals can be by second, by minute, hourly, daily, monthly, or yearly. In another form, the dynamic pricing modifier is based on the time between successive purchases. For example, if the time delay between successive purchases decreases, the dynamic pricing system **102** can infer that demand is increasing and thus increase the price for the item.

FIG. 26 is a flow diagram **2600** that illustrates a technique for dynamically pricing content items according to another embodiment of the present invention. In the technique illustrated in FIG. 26, the price of an item is changed based on the time delay between orders for the item. An initial price for the item for sale on the dynamic pricing system **102** is set in stage **2602**. The content supplier and/or the system administrator can set the initial price initial price for the item. Alternatively or additionally, the dynamic pricing system **102** in this and other embodiments can automatically set the initial price based on default prices and/or historical prices for similar content stored in memory **112**. In one form, the administrator through administrative computer **104** sets the initial price for content on the dynamic pricing system **102**. In another form, the content supplier sets the initial price in stage **2602**. In stage **2604**, the processor **110** of the dynamic pricing system **102** receives a customer order over the network **106**. From the clock **111**, the processor **110** in stage **2606** stores in memory **112** the time the order was received, and the dynamic pricing system **102** processes the order. It should be appreciated that the time recorded from the clock **111** can be based on other events related to the order, such as when the content was actually delivered. In stage **2608**, the processor **110** determines the time period (t) between the current purchase and the previous purchase of the item. In another form, the clock **111** is reset after each purchase such that the processor **110** stores in memory **112** the time period (t) between the current and previous purchases. Initially, at the first purchase of the item, the time period (t) between purchases can be based on the time delay between when the item was originally available on the dynamic pricing system **102** and when the first purchase was made. The time when the item was first available on the dynamic pricing system **102** can be stored into memory in stage **2602**. In another form, the processor **110** waits to receive a second order from a customer before calculating the time delay (t) between purchases. It should be appreciated that the dynamic pricing system **102** can record a series of purchase times before dynamically pricing an item.

In stage **2610**, the processor **110** determines the average time delay ((AVE(t)) between purchases. In one form, the

24

average time delay is calculated for all purchases, and in another form, the average time delay is calculated for a set number (N) of previous purchases so as to take into account shifts in the demand curve. In one particular form, the average time delay is calculated for the last 10 periods (N=10). Equation 15 below illustrates how the average time delay is calculated.

$$AVE(t) = \frac{t_i + t_{i-1} + \dots + t_{i-N+1}}{N} \quad (\text{Equation 15})$$

Where AVE(t)=Average Time Delay Between Purchases, t_i =Time delay Purchase Period i and N=Number of Periods

Generally, when the current time delay is less than the average time delay, it can be inferred that demand for the item has increased. Conversely, if the current time delay is greater, then it can be inferred that demand has lowered. In stage **2612**, the processor **110** of the dynamic pricing system determines whether or not the current time delay between purchases (t) is less than average time delay between purchases (AVE(t)). If the current time delay is less than the average, the processor **110** increases the price of the item in stage **2614**. In one form of the present invention, the price would be adjusted according to Equation 16 as illustrated below. As can be seen below, Equation 16 is derived from Equation 14.

$$P_{i+1} = P_i \times \frac{AVE(t)}{t_i} \quad (\text{Equation 16})$$

Where P_{i+1} =New Dynamic Price and P_i =Price Basis, or Current Price for Period i. In Equation 16, the price basis is the price of the item for the latest period, and the dynamic price is the new price for the item. For example, if the price of the item was currently \$1.20, the average time between purchases was 20 seconds and the current delay between purchases was 15 seconds, the new price for the item would be \$1.60 (1.20.times.20/15=1.60). In another form of the present embodiment, the processor **110** takes into account of the upper price, or price ceiling, for the item. As previously mentioned, the content supplier, such as the artist, and/or the system administrator can specify upper and lower price limits for a particular item, such as a song. If, for example, the calculated new dynamic price exceeded the upper price limit, the processor **110** in stage **2614** would set the new price to the upper limit price. It should be appreciated that other factors, such as the ones mentioned above, can be factored in when adjusting the price in stage **2614**. Potential customers can review the new, dynamic price **2404** in screen **2400** (FIG. 24A) and can decide whether to purchase the item at the new price **2404**. When a customer decides to purchase the item at the increased price (after stage **2614**), the processor **110** then proceeds to stage **2604** so as to process the next customer order.

If the current time delay (t) between purchases is not less than the average time delay between purchases in stage **2612**, then the processor **110** in stage **2616** determines whether the current time delay (t) between purchases is greater than the average time delay between purchases. If so, then it can be inferred that demand for the item has lowered, and the processor **110** in stage **2618** decreases the price of the item. In one form, the processor **110** reduces the price using Equation 16 (above). For example, if the price of the item was currently \$1.20, the average time between purchases was 15 seconds and the current delay between purchases was 20 seconds, the

25

new price for the item would be \$0.90 (1.20.times.15/20=0.90). As should be appreciated, the processor 110 can consider other factors, such as the quality of the item, marginal cost and available bandwidth, when adjusting the price in stage 2618. For instance, in one form, the processor 110 also determines in stage 2618 whether the new price is less than the predefined lower price limit, or floor, for the item. If the new price is less than the lower price limit, then processor 110 only sets the new price at the lower limit. In another embodiment, to prevent wild fluctuations in price, the dynamic pricing system 102 in stages 2614 and 2618 can dampen the price changes between periods. When in stage 2616 the current time delay (t) between purchases is not greater than the average time delay between purchases, the processor in stage 2620 makes no price adjustment. In another embodiment, to prevent the price from being locked into a local maximum price, the processor 110 in stage 2620 randomly adjusts the price. After stages 2614, 2618 or 2620, customers can review the new price and place orders in stage 2604.

A technique for dynamically pricing items according to another embodiment of the present invention will now be described with reference to flow chart 2700 in FIG. 27. In this technique, the databases 225 record the number purchases of each item in the dynamic pricing system 102. In one form of this embodiment, a dynamic pricing system 102 periodically updates the prices of each item for sale. The periodic update can be for every second, every minute, hourly, monthly, and/or yearly, to name a few time periods. In one form, the price of individual items is updated nightly. In another form, the prices are updated every minute. Each item for sale and/or type of item for sale, such a country songs, can be dynamically priced at different intervals and/or use different pricing techniques depending the nature of the item sold. For example, higher ticket items, which sell at a slower rate, may have their prices less frequently updated as compared to lower ticket items, which sell at higher volumes. Further, groups of items can be aggregately priced together.

As mentioned above, a number of different people can set the initial price of an item. For instance, the artist, content supplier, owner of the item, and/or the system administrator can set the initial price for an item. In stage 2702, the dynamic pricing system 102 stores in memory 112 the initial price as the current best price for the item. The processor 110 in stage 2704 stores in memory 112 the number of sales of the item at the initial price for a specified time interval and the profit generated (best profit). In one form, the pricing and quantity information is updated daily in the tables 302 of the database 225. After the specified time interval, the processor 110 randomly changes the price within a range around the best price in stage 2706. In one form, the dynamic pricing system 102 randomly adjusts the current price within -5% to +5% of the best price. As should be understood, the price can be randomly adjusted within different ranges. In another form, the price is randomly adjusted without having specified upper and/or lower range limits. In stage 2708, the processor 110 records in memory 112 the quantity order (Q_a) at the adjusted current price for the same time interval as in stage 2704 (for example, daily or every minute). The processor 110 in stage 2710 checks to see if the quantity ordered in the last time interval was greater than zero (0). If not, the processor 110 in stage 2712 reduces the current price. For example, the processor 110 can reduce the price by \$0.10 increments when there are no sales of the item within the specified period. In another form, the price is lowered by a percentage of the current price, such as 10% of the current price. If the price reduction in stage 2712 would reduce the current price below

26

the lower price limit, when specified, the process 110 sets the current price to the lower limit. As mentioned above, the lower limit may be based in part on the marginal and/or fixed costs for the item. After the price is reduced in stage 2712, the processor 110 in stage 2708 records the quantity sold at the new reduced price for the specified time interval. In an alternate form, the processor 110 in stage 2712 increases the time interval in which the quantity ordered is recorded in stage 2708. As should be appreciated, the processor 110 can both reduce the price and increase the time interval in stage 2712.

When in stage 2710 the quantity ordered at the adjusted price is greater than zero (0), the processor 110 determines whether the profit at the current price is at least equal to the best profit stored in memory 112. In one form, the processor 110 determines profit by using Equation 2, above. As should be appreciated, the dynamic pricing system 102 can take into account other factors when determining the profit. For example, these factors can include fixed costs, bandwidth used, and file size, to name a few. If in stage 2714 the current profit is equal to or better than the best profit at the best price, which is stored in memory 112, then the processor 110 in stage 2716 sets the current price as the best price in memory 112. In one form, the processor 110 also stores in memory 112 the quantity ordered at the now, best price such that profit can be calculated. In another form, the processor 110 stores in the memory 112 the current profit as the best profit. Following stage 2716, the processor 110 randomly increases the price for the item within a specified range above the current price. This range limit can be predefined and/or determined through historical data. In one form, the random price is generated within a range from 0% to 10% above the current price. It should be appreciated that the processor 110 can use a number of techniques for generating the random numbers (pseudo-random) as would occur to those of ordinary skill in the art. When an upper limit in price is defined, the price of the item will only be increased to the upper limit price. After the price is increased in stage 2708, the processor 110 proceeds to stage 2718 and records the quantity ordered (Q_a) at the new adjusted price. By changing the best price in stage 2716 even when the current profit is equal to the best profit in stage 2714, removes old best prices that may be based on a different demand curve.

In another alternative, the processor 110 in stage 2714 determines whether the profit at the current price is better than the profit at the recorded best price. If so, the processor 110 proceeds to stage 2716. If the current profit is equal to the best profit, then the best price remains the same, the current price is not adjusted, and the processor 110 proceeds to stage 2708.

When in stage 2714 the current profit is less than the best profit, the processor 110 in stage 2720 determines whether there is a small price difference between the current price and the best price. The small difference can be based on a percentage basis between the prices and/or by a fixed amount. In one form, the small price difference is less than or equal to a one-percent (1%) change the price. In another form, the small price difference is two-cents (\$0.02). It should be understood that other values can be used for the price differential. If there is a small price difference between the current price and the best price, the processor 110 proceeds to stage 2706 and randomly adjusts the prices within a range around the best price. Stage 2720 reduces the likelihood that the best price will be stuck at a local maximum in profit. When this problem is not a concern, stage 2720 can be omitted. If there is not a small difference in price between the best and current prices in stage 2720, the processor 110 in stage 2722 reduces the current price to halfway between the current price and the best price. For instance, if the current price is \$1.00 and the best

27

price is \$0.90, the new adjusted price would be \$0.95. As should be appreciated, the price in stage 2722 could be reduced by some other fraction of the price differential between the current price and the best price, besides one-half. In one form, if the reduced price is lower than the lower price limit for the item, then the new adjusted price in stage 2722 is set to the lower price limit for the item. After reducing the price in stage 2722, the dynamic pricing system 102 proceeds to stage 2708 and tracks the quantity ordered at the new adjusted price. As shown in FIG. 27, the dynamic pricing system 102 using the technique illustrated in flowchart 2700 continues to periodically adjust the price of items.

In another technique, the period of time between recording the quantity order is variable. This technique can be used in the applicable, above-described techniques for dynamically pricing items, but instead “quantity” in this technique is replaced with “quantity/length of time period”. For example, in stage 2708 of flow chart 2700, the “quantity ordered/length of time period” is recorded when the time period is variable. The dynamic pricing system 102 for instance would record one-hundred songs per hour (100 songs/hour) when one-hundred and fifty (150) songs are ordered in a one and a half hour (1.5) time period. By recording the “quantity/length of time period” improves sampling during slow order periods, such as at night.

As should be appreciated, different items for sale on the dynamic pricing system 102 may use different techniques for dynamically pricing the items. For example, popular music may be dynamically priced according to the technique illustrated in FIG. 26; while text may be dynamically priced according to the technique illustrated in FIG. 27. In another example, “popular” songs are dynamically priced using a variable time period; while “classical” songs are dynamically priced using a fixed time period.

In one embodiment of the dynamic pricing system 102, servlets perform the above-described functions in order to operate the dynamic pricing system 102. In one form, Java servlets are used. As should be appreciated the dynamic pricing system 102 can use other types of systems in order to operate. A block diagram 2800 showing the relationship of servlets 2801 loaded on each of the navigation servers 204 is illustrated in FIG. 28. In diagram 2800, dashed arrows 2802 represent links between pages and solid arrows 2803 represent data flow. Main page servlet 2804 generates the anonymous main page 500 when the user is not logged into the dynamic pricing system 102 and the registered user main page 1000 when the user has logged onto the dynamic pricing system 102. Registration servlet 2805 handles user registration with the dynamic pricing system 102. As depicted, the registration servlet 2805 creates the registration form(s) 600. Once the user submits form 600, the registration servlet 2805 adds the new user to the user database 236 and logs in the new user automatically. Login servlet 2806 is responsible for logging in registered users into the dynamic pricing system 102. As shown, the login servlet 2806 includes an add session servlet 2808 which adds a new sessions to the session table 314 in the user database 236. For example, after the registration servlet 2805 registers a new user, the registration servlet 2805 automatically logs in the new user by calling the add new session servlet 2808. The login servlet 2806 generates the login form 900, and once the user submits a filled-out login form 900 to the navigation server 204, the login servlet 2806 checks to see if the username and password are valid by comparing the entered username and password with the user database 236. If the username and password are valid, the add new session servlet 2808 adds a new session to the session table 314 in the user database 236. After the user is logged into

28

the dynamic pricing system 102, the login servlet 2806 returns control back to the servlet 2801 that originally called the login servlet 2806. Any page that requires the user to have a session will query the session table 314 in the user database 236 before the user is allowed to proceed. If the user does not have a current session, the login servlet 2806 is called so that the user can login to the dynamic pricing system 102.

In FIG. 28, account information servlet 2810 is responsible for maintaining the user account tables 312 in the user database 236. The account information servlet 2810 generates the forms, such as forms 1200 and 1500, that are used to update the account tables 312 in the user database 236. Navigation heartbeat servlet 2811 monitors the operational load of the servlets 2801 on the navigation server 204 and transmits the load information to the heartbeat server 206. Moreover, the navigation heartbeat servlet 2811 retrieves load information about the other components of the dynamic pricing system 102 from the heartbeat server 206 and communicates the load information of the other components to the individual servlets on the navigation server 204.

Search servlet 2812 processes search requests from the users. As illustrated, the search servlet processes the search forms, such as simple search form 512, media form 1800 and advanced search form 1600. For example, the search servlet 2812 can transmit the advanced search form 1600 to the client 108. After the user through client 108 submits a filled-out advance search form 1600 to the navigation server 204, the search servlet queries one or more of the databases 225, and the databases 225 return results from the query to the search servlet 2812, which in turn sends search results page 1700 to the client 108. An alternate view of the same process is illustrated in FIG. 2. In this example, the client 108 submits a search request form, as shown by arrow 250, to the connection server 202. The connection server 202 based on the load information from the navigation heartbeat servlet 2811, which was supplied by the heartbeat server 206, directs the submitted form, as shown by request arrow 252, to one of the navigation servers 204. As shown by query arrow 256, the search servlet 2812 on the navigation server 204 queries one or more of the databases 225. The results from the query, as shown by results arrow 258, are returned to the search servlet 2812. Based on the results, the search servlet 2812 generates the search results pages 1700 or 2300, for example, and as indicated by arrow 260, the navigation server 204 transmits the search results page 1700 to the client 108.

Although not loaded on the navigation server 204, file servlet 2814 is shown in FIG. 28 in order to show how the file servlet 2814 relates to the other servlets 2801 on the navigation server 204 in FIG. 28. As shown in FIGS. 28 and 29, the file servlet 2814 runs on the file servers 210 and is responsible for generating the download form 2400. The file servlet 2814 further verifies if the user has a valid, current session identification. If not, then the user is requested by the login servlet 2806 to login to the dynamic pricing system 102. After logging into the system, control is returned to the file servlet 2814. The download form 2400 is generated based on the media ID 318 and the home server location 328 that is stored in the media information tables 304. For example, the file servlet 2814 sends the download form 2400 to the customer device 124, and when the customer selects buy link 1732 in page 1700 or buy link 2320 in page 2300, the file servlet 2814 gets the pricing information from the pricing tables 306 in the databases 225 and debits the user account 390 in the user database 236. The file servlet 2814 further updates the quantity demand in the pricing 306 and media information 304

29

tables. As shown by arrow 264 in FIG. 2, the file servlet 2814 transfers a file containing the purchased content to the client 108.

As depicted in FIG. 29, each file server 210 incorporates a number of servlets 2801 that are used to control the operation of the file server 210. The servlets 2801 on the file server 210 include the file servlet 2814, a file heart beat servlet 2902, a resume download servlet 2904 and a populate servlet 2906. The file heartbeat servlet 2902 collects the load information from the servlets 2801 on the file server 210 and sends beat information to the heartbeat server 206. The file heartbeat servlet 2902 further retrieves the load information for the other file servers 210 and the database servers 208 from the heartbeat server 206. The heartbeat servlet 2902 communicates the load information to the other servlets 2801 on the file server 210. As mentioned above, the file servlet 2814 downloads purchased items to the clients 108. If while downloading an item, the user becomes disconnected from the network 106 or the download is interrupted in some other manner, the resume servlet 2904 allows the customer to download the content again for a specified period without being charged. For example, if a customer device 124 is disconnected from the dynamic pricing system 102 while downloading a song, the customer can download the song again within two days without having the price of the song deducted from their account for a second time.

In order to service high demand for a particular item, the populate servlet 2906 on each of the file servers 210 collects the number of current downloads of an item and determines which files need to be copied across multiple file servers 210. For example, when a song becomes popular, the populate servlet 2906 places copies of the song on multiple file servers 210, as indicated by arrow 2908. The home file server 210 for the particular song maintains a table that identifies the file servers 210 that have copies of the song. If the home file server 210 for the song is busy when a request to download the song is received, the home file server 210 forwards the request to one of the file servers 210 that has a copy of the song file, which processes the download request. Since the file servlet 2814 of the home file server 210 is always contacted first, the home file server 210 is always able to track the demand of the item and increment the demand in the pricing 306 and media information 304 tables.

As shown in FIG. 30A-30E each database server 208 includes a number of servlets 2801 that perform specific tasks on the database server 208. Perform query servlet 3002 can be called by any other part the dynamic pricing system 102, as shown by arrow 3004. As shown by arrow 3006, servlet 3002 can query, insert and/or delete records from the tables 302 of the databases 225. The results of the query, as indicated with arrow 3008, can be returned to servlet 3002.

As indicated by arrow 3010 in FIG. 30B, search servlets 2812 on the navigation servers 204 call execute search servlet 3012 on the database servers 208 in order to search for particular keywords in the media information tables 304. To improve response time for queries, the database servers 210 each maintain a keyword cache 3014 along with a media and pricing information cache 3016. The keyword cache 3014 is structured like the keyword table 308 and maintains a temporary list of popular keyword searches. The media and pricing information cache 3016 temporarily stores information about individual media items along with their current price. Like the keyword tables 308 and the media information tables 304, keyword cache 3014 and media cache 3016 are linked to one another via the media ID 318. When the execute search servlet 3012 receives a simple, or default search request, the execute search servlet 3012, as shown by arrow 3018, first

30

queries the keyword cache 3014. For instance, a simple search can occur when the user is browsing by media type, such as the searches submitted through field 512. When the keyword cache 3014 contains the search keyword, the media cache 3016 returns the search results to servlet 3012, which is depicted with arrow 3020. As shown by arrow 3022, when the keyword cache 3014 does not include an entry for the keyword, the keyword table 308 is then queried. The keyword table 308 is directly queried by servlet 3012, when the user submits an explicit search, such as with form 1600 (arrow 3024). As mentioned above, the keyword 308 and pricing 306 tables are related to the media information table 304 via the media ID field 318. As shown by arrow 3026, the search results from tables 304 and 306 are returned to the execute search servlet 3012, which in turn returns the results to the search servlet 2812 (FIG. 28). As previously discussed, the search results can include the dynamic price for an item, such as a song. The dynamic price for the item is either retrieved from cache 3016 or from the pricing table 306.

As illustrated in FIG. 30, get media file information servlet 3028 is used to retrieve media and pricing information that is used by the file servers 210. As shown by arrow 3030, the file servers 210 can call servlet 3028. The media information servlet 3028 first sends all requests (arrow 3032) to the media cache 3016. If cache 3016 is able to process the request, the search results (arrow 3034) are returned to servlet 3028. When cache 3016 is unable to process the request, the search request is then processed by the media 304 and pricing 306 tables (arrow 3036). In response to the request, tables 304 and 306 insert a new entry corresponding to the search results into the media cache (arrow 3038) and return the search results to the media information servlet 3028 (arrow 3040). Afterwards, the search results from servlet 3028 are then returned to the calling file server 210.

As depicted with arrow 3042 in FIG. 30D, the file servers 210 call increment demand servlet 3044 to increase the quantity demand for an item in the media cache 3016. Servlet 3044 can either insert a new demand entry or update a demand entry for an item in cache 3016 (arrow 3046). For instance, when an item is purchased and downloaded the file server 210 will call the increment demand servlet 3044 in order record an order of the item. If a record for the item is not in cache 3016, increment demand servlet 3044 will create a new record in cache for the item. The record in cache 3016 can contain the media ID 318 and demand 348 (or 350) fields. When a record for the item already exists in cache, servlet 3044 increases the number contained in the demand field 350. Periodically, cache 3016 is cleaned and the demand information contained therein is transferred to the media 304 and pricing 306 tables before cleaning.

In each of the database servers 208, dynamic pricing servlet 3048 is used to dynamically price items in system 102. Servlet 3048 includes an initialization thread 3050, one or more pricing threads 3052, and one or more cleaning threads 3054. On startup of the database server 208, the initialization servlet 3050 retrieves the names of all of the pricing algorithms in field 336 for each item (arrow 3056) and starts a pricing thread 3052 for each pricing technique. As previously discussed, the dynamic pricing system 102 can use different techniques to price individual items and/or groups of items. For instance, country songs can be dynamically priced by a first pricing thread 3052 that uses the technique illustrated in FIG. 26; while jazz songs and mystery books can be dynamically priced by a second pricing thread 3052 that uses the technique illustrated in FIG. 27. In one form, as shown by arrow 3058, the pricing thread 3052 periodically updates at specified intervals the prices of items in fields 346 and 356 of

31

the media table **304** and pricing table **306**, respectively. After updating the pricing information in tables **304** and **306**, the pricing thread **3052** then updates the pricing information in media cache **3016**, as shown by arrow **3060**. In one embodiment, the pricing thread **3052** updates the pricing information in tables **304** and **306** for all items that use the pricing thread **3052**, and then updates the prices in cache **3016** for the items. In another embodiment, the pricing thread **3052** updates the pricing information in the media **304** and pricing **306** tables along with media cache **3016** individually for each item. The pricing threads **3052** can dynamically price items at different intervals, such as by minute, hourly, or daily. In one form, the pricing threads **3052** dynamically price items daily. When pricing thread **3052** uses the technique of dynamically pricing items based on time between purchases (FIG. 26), the pricing thread **3052** does not necessarily have to update the price at a fixed interval. For example, the pricing thread can update the price of the item after the item is purchased or when a page containing the price for the item is generated.

In FIG. 30E, the cleaning thread **3054** periodically removes items with low demand from the media cache **3016**, as shown by arrow **3062**, and commits these items removed from cache **3016** to the media **304** and pricing **306** tables, as indicated by arrow **3064**. For instance, when the demand for an item in the last dynamic pricing period was zero (0), the cleaning thread **3054** removes the information about the item, such as the media ID, price and demand, from the media cache **3016** and commits this information to tables **304** and **306**. It should be understood that the dynamic pricing system **102** can include a single cleaning thread **3054**, multiple cleaning threads **3054** or no cleaning threads **3054** at all. For example, no cleaning threads **3054** are needed, when cache is not used. In one form, the cleaning thread **3054** operates periodically in conjunction with a corresponding pricing thread **3052**. For example, each pricing thread **3052** can have a corresponding cleaning thread **3054** that runs either before or after the pricing thread **3052** dynamically prices items. In another form, the cleaning thread **3054** periodically operates at a different time interval as compared to the corresponding pricing thread **3052**.

A technique for receiving content and paying content suppliers will now be described below with reference to flow chart **3100** in FIG. 31. In stage **3102**, a content supplier registers to supply content for sale on the dynamic pricing system **102**. As mentioned above, the content suppliers can be for example artists, authors, agents, publishers, content owners, programmers, record labels, publishers, licensing organizations, producers, and the like. Referring to FIG. 10, the content supplier initiates the registration process by selecting artist button **522**. After button **522** is selected, the dynamic pricing system **102** sends to the content supplier computer **116** an artist agreement and release form **3200**. As illustrated in FIG. 32, form **3200** includes an agreement portion **3202** in which the terms of the artist agreement and release are listed. The name and address of the content supplier can be entered into fields **3204** and **3206**, respectively. As should be appreciated, form **3200** can contain other fields in which additional information can be entered. The content supplier agrees with the terms of the agreement by selecting agree button **3208** and cancels the agreement by selecting cancel button **3210**. In a further embodiment, the content supplier accepts the contract by applying their digital signature to the agreement form **3200** and sending an email with the agreement form **3200** to the dynamic pricing system **102**. After form **3200** is submitted, the dynamic pricing system **102** can store a copy of the agreement in the database **225** for future reference.

In response to the submission of form **3200**, the dynamic pricing system **102** sends to the content supplier computer

32

116 a content pricing and download form **3300**. In later sessions, once the content supplier has accepted the agreement in form **3200**, the dynamic pricing system **102** will send the pricing form **3300** when artist button **522** is selected. With form **3300**, the content supplier is able automatically submit content for sale on the dynamic pricing system **102**. As depicted in FIG. 33, form **3300** includes a title field **3302**, a length field **3304**, a file location field **3306**, an initial price field **3308**, a minimum price field **3310** and a maximum price field **3312**. The content supplier can enter the title of the work in field **3302** and the length of the work in field **3304**. The filename and path on the content supplier computer **116** for the file that contains the work for sale is entered into field **3306**. In another embodiment, the content supplier can enter the path and/or IP address of another client **108** that contains the work in field **3306**. The content supplier enters the initial offering price of the work into field **3308**. Alternatively, the content supplier can leave field **3308** blank such that the administrator sets the initial price or a default initial price value is used. The content supplier can enter the minimum and maximum price of the work in fields **3310** and **3312**, respectively. Alternatively, the content supplier can leave fields **3310** and **3312** blank so that no pricing limits are used when system **102** dynamically prices the work. In another embodiment, the content supplier with form **3300** can determine the rules, pricing techniques and time frames for the sale of the items. For example, when the content supplier provides a subscription service, such as for web site access to a music subscription service, the content supplier limit the access time to one week and/or specify the number of searches on the site. As should be appreciated, form **3300** can omit fields and/or contain additional fields, such a type of work field, an artist identification field, a cost field and a field specifying the dynamic pricing technique to use. In another embodiment, a spreadsheet interface is used to enter information for larger number of works, and in a further embodiment, database files for the items for sale from the content supplier are imported into the dynamic pricing system **102**.

To submit the work, the content supplier selects submit button **3314**, and in response, the content provider computer **116** transfers over the network **106** the file specified in the file location field **3306** along with the other information from form **3300** to the dynamic pricing system **102**. As should be appreciated, with the P2P embodiment of the dynamic pricing system **102**, the client **108** only needs to transfer the information from form **3300** to system **102** and does not need to transfer the file. However, in another form of the P2P embodiment, the file is transferred. In stage **3104**, the dynamic pricing system **102** receives the file containing the downloaded content and the other information from form **3300**. The dynamic pricing system **102** stores the downloaded file in at least one of the file servers **210** and submits the information about the work to the database servers **208**. In another embodiment, the dynamic pricing system **102** adds the work to the master database server **212** and the master file server **214**, which in turn updates the database **208** and file **210** servers so as to incorporate the new work. In the pricing form **3300**, the content provider can cancel a submission by selecting cancel button **3316**.

In another embodiment, stages **3102** and **3104** can be performed manually. For example, the artist can manually execute the required paperwork and mail the paperwork along with copies of the content, such as a CD containing the work, to the administrator of the dynamic pricing system **102**. Once the paperwork and content is received, the administrator with the administrative computer **104** can add the work and pricing information to master servers **212** and **214**. During their peri-

33

odic update of the database 208 and file 210 servers, the master database server 212 and master file server 214 add the new work to servers 208 and 210.

In stage 3106, the dynamic pricing system 102 tracks the purchases of the work, and the dynamic pricing system 102 stores the price and quantity demand for the item in the database servers 208. In stage 3108, the content supplier of the work is compensated for the work. The owner of the dynamic pricing system 102 generates revenue by receiving a portion of the revenue generated by the sale of items on the dynamic pricing system 102. In one embodiment, the content supplier is paid a percentage of the profit generated from the sales of the work on the dynamic pricing system 102. In another embodiment, the content supplier is paid a fixed fee for each time the work is purchased, and in a further embodiment, the content supplier can be paid a flat fee for the work. The compensation can be sent to the content supplier in a number of manners. For example, each time the work is sold, the account balance 390 for the content provider can be credited. The content supplier can also have the money credited to a deposit account each time the work is purchased. Alternatively, the dynamic pricing system 102 can periodically send a check to the content supplier for the amount the work earned during the last period. In another arrangement, the third party payment system 136, such as PayPal.com, supplies the payment to the content supplier. It should be understood that other types of compensation arrangements can be made.

As discussed above, institutions such as colleges and universities have blocked file swapping services from their networks 115 because the large volumes of downloads from such systems clog their networks 115. With the high loads created by the file swapping services, institutions bear significant costs and yet receive no benefit from the file swapping services. A technique for providing institutions incentives to allow their members access the dynamic pricing system 102 will now be described with reference to flowchart 3400 in FIG. 34. With this technique, since institutions benefit when their members to use the dynamic pricing system 102, the institutions will be more inclined to not block access to the dynamic pricing system 102. In stage 3402, a representative of the institution, which operates network 115, registers with the dynamic pricing system. During the registration stage 3402, the representative provides the name of the institution along with other information about the institution to the dynamic pricing system 102. The representative can register the institution directly with the dynamic pricing system 102 by filling out an online form. Alternatively, the representative can contact and supply the information to the system administrator, and the system administrator can then enter the information into the dynamic pricing system 102. In another embodiment, institutional registration is optional such that an institution does not need to register in order to receive compensation. For example, the institutional network 115 can be automatically identified by the IP address of the user, and the compensation can be forwarded to the institution and/or the institution contacted about the compensation without requiring any registration by the institution. The representative in stage 3402 further indicates how members of the institution can be identified. These institutional member identifiers can include, but are not limited to, the IP addresses of the institutional devices 125, the IP address of a firewall for the institutional network 115, a client identifier such as a "cookie", and the domain name for the institution. In one form, the domain name for email accounts on the institutional network 115 is used to identify institutional members like college students. Moreover, in stage 3402, the representative can specify how any revenue generated by the institution on

34

the dynamic pricing system 102 is to be paid. For example, a university can designate a particular scholarship that will receive the funds from the dynamic pricing system 102. After the institutional information is submitted, the dynamic pricing system 102 stores the information (all or part) in the database servers 208. In one form, the dynamic pricing system 102 creates a user account for the institution and records the institutional information in the user account. In another form, the institutional information is maintained in one or more separate database tables 302.

In stage 3404, the dynamic pricing system 102 receives a purchase request from a customer, and in stage 3406, the processor 110 of the dynamic pricing system 102 determines whether the customer is a member of one of the registered institutions. In one embodiment, system 102 compares the domain name in the email address field 386 of the customer in account table 312 with the domain name supplied by the institution in order to determine if the customer is a member of the institution. For example, if a college specified that its students have the "college.edu" domain name in their email addresses, then any student that entered an email address with the "college.edu" in the email address field 624 of form 600 (FIG. 6), such as "jsmith@college.edu", would be identified as a member of that college. In another embodiment, system 102 compares the IP address, or some other addressing scheme, of the customer device 124 with the IP addresses (or other address) given by the institution in order to determine if the customer is a member of the institution. If the customer is a member of the institution, the dynamic processing system 102 in stage 3408 credits the account of the institution and in stage 3410 processes the order from the customer. If in stage 3406 the customer is not an institutional member, then system 102 proceeds to stage 3410 in order to process the order. After processing the order in stage 3410, the dynamic pricing system is able to receive other orders in stage 3404. As should be appreciated, the stages in flow chart 3400 can be performed in a different sequence than is shown. For example, the order can be processed and fulfilled in stage 3410 before the dynamic system 102 determines whether or not the customer is an institutional member in stage 3406. In another embodiment, the dynamic pricing system 102 periodically (such as monthly) reviews the purchases of customers that have been identified as institutional members and credits the account of the institutions based on the purchases of their members.

The money accumulated in the institution account can be disbursed at set intervals, at variable intervals, when a specific amount is accumulated, after every purchase by a member, when a specified traffic level is reached and/or in other manners as specified by the institution. As should be appreciated, the payments can be made in the same manners as described above for the content suppliers. For instance, one or more scholarships, which were designated by the university, can receive a monthly check from the dynamic pricing system 102 for the last month's account balance. By directly and/or indirectly receiving compensation from the dynamic pricing system 102, institutions that run institutional networks 115 are provided with an incentive to allow their members to access the dynamic pricing system 102. In one form, five-percent (5%) of sales are rewarded to the institution, and in another form, the institution is rewarded \$0.005 (½ cent) from each sale. As should be understood other types of compensation packages and/or amounts can be used. It should be appreciated that the above technique can be applied to other types of institutions, besides learning institutions, that experience problems with high network traffic, such as charitable organizations and corporations.

35

In one embodiment of the dynamic pricing system for dynamically pricing items for sale by a seller which items are available in a limited quantity (for which there is an inventory amount) are priced dynamically with the desired affect of selling off the inventory by an expiration time. The dynamic pricing system controls the rate of sale in order to sell out all items by a certain expiration time. In one embodiment, the system raises the price to slow the rate of sale and lowers it to speed the rate of sale.

Those skilled in the art will recognize that items may be available in a limited quantity for a various reasons. For example, the item to be sold may have a physical limited quantity, e.g. MLB homerun balls hit by Babe Ruth, limited editions of collectibles, seats in an entertainment or travel venue or rooms in an accommodation. Another example of limited quantity items would be items for which a seller is under a contractual or legal limitation as to the number that may be sold. Additionally, the items may be simply the number of remaining items on hand, such as items in stock at the start of a business liquidation sale. No limitation should be placed on the reason for which an item is "an item available in a limited quantity" as that term is used in the application.

The expiration time is a time by which a seller would like to liquid their inventory of an item available in a limited quantity. The expiration time may be any time picked by the seller or may be a time mandated by the type of item sold, e.g. the sell by date on a perishable item, or the date of an entertainment event or commercial travel. The expiration time may be a specific date on which it is desire that full occupancy be obtained in an accommodation. No limitation should be placed on the reason for which an expiration time is selected.

The database present in memory 112 includes various types of data to facilitate dynamically pricing the item available in a limited quantity in a manner that will likely result in the inventory of the item becoming exhausted at or near the expiration time. Among the data stored in memory 112 will be data indicative of the initial quantity of an item available in a limited quantity. Another type of data stored in memory 112 is data indicative of the current remaining quantity of the item available in a limited quantity. Yet another type of data stored in memory 112 is data indicative of an expiration time at which it is desired that all of the item available in a limited quantity be sold. Other data may include time stamped data indicative of the time of each sale of the item available in a limited quantity. This time stamped sales data may be linked or otherwise associated with other data regarding the sale, such as the price at which the sale was consummated, the buyer's name, demographic information regarding the buyer or any other data already described as being present in the database. In one embodiment, the data stored in memory 112 includes data indicative of the price at which the item available at a limited quantity was sold for each sale of the item with such data being associated with the appropriate time stamped data indicative of the time at which the item was sold at such price. From the time stamped date, sales history data for each item available in a limited quantity may be stored in the database or may be generated from data stored in memory 112 by the processor 110.

The processor 110 is configured to price the item available in a limited quantity so as to deplete the inventory of the item available in a limited quantity by the expiration date based in part by accessing the memory 112 to retrieve the data indicative of the initial quantity, the current remaining quantity and the expiration time and accessing the clock 111. In one embodiment, the processor 110 is configured to increase the price of the item available in a limited quantity when the data stored in memory 112 indicates that inventory of the item

36

available in a limited quantity based on its prior sales history is likely to be exhausted prior to the expiration time. In another embodiment, the processor 110 is configured to decrease the price of the item when the data stored in memory 112 indicates that remaining inventory of the item available in a limited quantity based on its prior sales history is likely to exist at the expiration time.

In one embodiment, the dynamic pricing server utilizes a pricing model that analyzes sales rates. By accessing from memory 112 the data indicative of the initial inventory, the data indicative of the remaining inventory and the data indicative of an expiration time, the processor 110 of the pricing server can calculate how many items need to be sold by the expiration time. The processor 110 uses this information and the current rate of sales to decide whether the price should go up (to slow the rate of sales) or down (to increase the rate of sales). In some embodiments, the pricing server maximizes revenues and sales in the allotted time frame.

As previously mentioned, among the data stored in memory 112 is data indicative of the initial quantity of an item available in a limited quantity. For a given product, this is the total number available for sale or the amount of inventory to be depleted by the expiration time. The total supply, in conjunction with the current number of products sold, determines the sales rate required to sell out by the given end date. The current number of products sold can be determined by subtracting the value of the data stored in memory that is indicative of the current remaining quantity from the value of the data indicative of the initial quantity of the item available in a limited quantity. If the seller's supply of a product increases, then the sales rate required to completely sell out the product will increase, likely causing the price to drop. If the seller's supply decreases, then the sales rate required to completely sell out will decrease, likely causing the price to rise.

The data stored in memory 112 that is indicative of an expiration time at which it is desired that all of the item available in a limited quantity be sold establishes an end date. The end date is the date and time by which the total supply of a product must be exhausted. Preferably the product, or item available in a limited quantity, to have a meaningful, non-arbitrary end date. In one embodiment, the processor 110 of the dynamic pricing server utilizes a pricing model that strives to sell all of the supply of a product at the highest price possible. In one embodiment, the processor 110 of the pricing server is configured to attempt dynamically price the product to sell the last product at the last minute on the last day. Supposing similar supplies and purchasing characteristics, a product with a later end date, since it has a longer time to sell the same amount of product, will, in principle, sell for a higher average price than a product with a sooner end date. In many instances, where it is desirable to maximize profits, because the average price and therefore the total profit of a product depend so much on the length of time the product is up for sale, the expiration time might represent a point where the product either becomes worthless or has a very great drop in worth.

As previously mentioned, the databases present in memory 112 may include data indicative of a minimum price for a product. The minimum price is the lowest price allowed to be assigned to the product.

One embodiment of a pricing parameter model which the pricing server is configured to implement in order to exhaust the inventory of a product available in a limited quantity by an expiration date utilizes a pricing interval length parameter, a significance level parameter, a δ (delta) parameters.

The pricing interval parameter is indicative of the length of time between data analysis and price calculation. A longer

37

interval will allow for better mitigation of rapid jumps and drops in demand cycles, but won't allow the pricing model to react as quickly. A shorter interval will allow the pricing model to react quickly to jumps and drops in demand cycles, but may overreact to some of those jumps and drops.

The significance level parameter determines the points of probability at which the processor 110 is configured to determine to either lower, raise, or maintain the price of the item available in a limited supply. A lower significance level will decrease the range of probabilities in which a price can be raised or lowered and increase the range of probabilities in which a price will be left alone. Popular values for significance level parameters are 0.01, 0.05, and 0.10. A value of 0.05 for the significance level parameter may provide desired results in embodiments of the disclosed system.

The delta δ parameter is used to calculate a new price both in the event that it is determined that the price must rise and in the event that the price must fall. In the case of a price rise, 6 is used in the form:

$$P_N = P_O * (1 + \delta) \quad (\text{Equation 17})$$

In the case of a price fall, δ is used in the form:

$$P_N = P_O / (1 + \delta)^\alpha \quad (\text{Equation 18})$$

In both cases, a greater δ will result in a greater change in price. The value of δ used in simulations of one embodiment of the system for dynamically pricing items for sale by a seller which items are available in a limited quantity with the desired affect of selling off the inventory by an expiration time was 0.10.

The alpha α parameter is used to calculate the new price in the case of a price fall. When used, it takes the form:

$$P_N = P_O / (1 + \delta)^\alpha \quad (\text{Equation 19})$$

A greater value for the alpha α parameter will result in a greater drop in price. The value of α used in the simulations of one embodiment of the system for dynamically pricing items for sale by a seller which items are available in a limited quantity with the desired affect of selling off the inventory by an expiration time was 0.5.

In one embodiment, the algorithm implemented by the processor 110 receives seven inputs, the total supply of the product remaining, the total time left, the current price of the product, the sales at the current price, the time at the current price, the minimum price, the significance level delta and alpha parameters. In this embodiment, the algorithm runs periodically, e.g. every T minutes (the pricing interval parameter), and the price of the product starts at an initial price supplied by the seller. The initial price may be established in other manners within the scope of the disclosure. The algorithm determines the rate at which the product must be sold to exhaust the inventory of the product at the expiration time by dividing the total supply of the product left by the time remaining until the expiration time. The algorithm then causes the processor 110 to calculate the probability that the when selling at the calculated sales rate that s or fewer products would be sold in an interval t. This probability can be expressed in many ways, however, in one specific embodiment, the probability $P_{<st}$ is expressed

$$P_{<st} = e^{(-2\pi t)} \sum_{i=0}^k (z * t)^{i/i!} \quad (\text{Equation 20})$$

The processor 10 then calculates the probability that, when selling at the calculated sales rate, that more than the current

38

sales rate will be accomplished in the interval t. This probability can be expressed in many ways, however, in one specific embodiment, the probability $P_{>st}$ is expressed:

$$P_{>st} = 1 - P_{<st} \quad (\text{Equation 21})$$

If the more than the current sales rate will be accomplished in the interval t is greater than the significance level parameter ($P_{>st} < \text{Significance level parameter}$), then the price is increased by the processor 10. This is because it would be very likely that the actual rate of sales is higher than the currently calculated sellout rate and therefore the price should be increased to avoid depleting the remaining inventory prior to the expiration time. In one specific embodiment, the new raised price is the current price times the sum $(1 + \delta)$. If the processor does not determine that $P_{>st} < \text{Significance level parameter}$, then the processor determines whether probability that s or fewer products would be sold in an interval t is less than or equal to the significance level parameter ($P_{<st} < \text{significance level}$). If so, the price of the product is lowered from the current price. In one specific embodiment the price is lowered to a level of the current price divided by $(1 + \delta)^{\alpha}$. The price is lowered because if $P_{<st} < \text{significance level}$, then it is very likely that the actual sales rate is significantly lower than the sell out rate.

In one embodiment, if the price is lowered, the processor 110 may check memory 112 to determine if the new price is less than a minimum price set by the seller and if so adjust the new price to the minimum price. Otherwise the price of the product is left at the current price and another cycle of the algorithm is performed.

As should be appreciated the above-discussed dynamic pricing system 102 can be used to dynamically price other types of items. These items can include, but are not limited to, movie tickets; concert tickets; CD's containing selected songs; DVD's; artist memorabilia, such as t-shirts and the like; and video rental coupons. The coupons and tickets can be downloaded from the dynamic pricing system 102 and/or physically delivered to the customer. When a ticket or coupon is downloaded, the customer can print the ticket out with the printer 125. To prevent forgery, the tickets and coupons can contain authentication information, such as a unique serial number, bar code and/or design. Artist memorabilia for example can be physically delivered to the customer or the customer can download a coupon that can be redeemed at a local store in order to receive the memorabilia. Likewise, a CD containing selected songs and/or albums can be mailed to the customer or a coupon for the CD can be redeemed at a local store.

While the invention has been illustrated and described in detail in the drawings and foregoing description, the same is to be considered as illustrative and not restrictive in character, it being understood that only the preferred embodiment has been shown and described and that all changes and modifications that come within the spirit of the invention are desired to be protected.

What is claimed is:

1. A dynamic pricing system for pricing items for sale by a seller which items are available in a limited quantity, the system comprising:

- a pricing server including a memory, a processor and a clock;
- data stored in the memory indicative of an initial quantity of items available in a limited quantity;
- data stored in the memory indicative of a current remaining quantity of the items available in a limited quantity;

39

data stored in the memory of an expiration time at which it is desired that all of the items available in a limited quantity be sold;

wherein the processor is configured to control a rate of sale in order to sell out the items available in a limited quantity at or near the expiration time and to price the items available in a limited quantity so as to deplete an inventory of the items available in a limited quantity at or near the expiration time based in part by accessing the memory to retrieve the data indicative of the initial quantity, the current remaining quantity and the expiration time and accessing the clock;

wherein the processor is configured to increase the price of the items available in a limited quantity when the data stored in the memory indicates that inventory of the items available in a limited quantity based on prior sales history is likely to be exhausted prior to the expiration time; and

wherein the processor is configured to decrease the price of the items when the data stored in the memory indicates that at least some of remaining inventory of the items available in a limited quantity based on prior sales history is likely to exist at the expiration time.

2. The system of claim 1 further comprising data stored in the memory indicative of a sales history of the items available in a limited quantity.

3. The system of claim 2 further comprising time stamped data stored in the memory indicative of each sale of the items available in a limited quantity.

4. The system of claim 3 further comprising data stored in the memory of the price at which the items available at a limited quantity was sold for each sale of the item, such data being associated with the time stamped data indicative of the time at which the item was sold at such price.

5. A dynamic pricing system for pricing items for sale by a seller which items are available in a limited quantity, the system comprising: a

pricing server including a memory, a processor and a clock; data stored in the memory indicative of a current remaining quantity of items available in a limited quantity that is on sale;

data stored in the memory indicative of a time and price of each sale of the items available in a limited quantity;

data stored in the memory of an expiration time at which it is desired that all of the items available in a limited quantity be sold; and

wherein the processor is configured to control a rate of sale in order to sell out the items available in a limited quantity at or near the expiration time and to price the items available in a limited quantity so as to deplete an inventory of the items available in a limited quantity at or near the expiration time based in part by accessing the memory to retrieve the data indicative of the current remaining quantity, the time and price of each sale, and the expiration time and accessing the clock;

40

wherein the processor is configured to increase the price of the items available in a limited quantity when the data stored in the memory indicates that inventory of the items available in a limited quantity based on prior sales history is likely to be exhausted prior to the expiration time; and

wherein the processor is configured to decrease the price of the items when the data stored in the memory indicates that at least some of remaining inventory of the items available in a limited quantity based on prior sales history is likely to exist at the expiration time.

6. The system of claim 5 further comprising data stored in the memory indicative of a sales history of the items available in a limited quantity.

7. The system of claim 6 further comprising data stored in the memory indicative of an initial quantity of the items available in a limited quantity.

8. A dynamic pricing system for pricing items for sale by a seller which items are available in a limited quantity, the system comprising:

a pricing server including a memory, a processor and a clock;

data stored in the memory indicative of an initial quantity of items available in a limited quantity;

data stored in the memory indicative of a current remaining quantity of a-n the items available in a limited quantity that is on sale;

data stored in memory indicative of a time and price of each sale of the items available in a limited quantity; and

wherein the processor is configured to control a rate of sale in order to sell out the items available in a limited quantity at or near an expiration time and to price the items available in a limited quantity so as to deplete an inventory of the items available in a limited quantity at or near the expiration time based in part by accessing the memory to retrieve the data indicative of the initial quantity, the current remaining quantity, and the time and price of each sale, and accessing the clock;

wherein the processor is configured to increase the price of the items available in a limited quantity when the data stored in the memory indicates that inventory of the items available in a limited quantity based on prior sales history is likely to be exhausted prior to the expiration time; and

wherein the processor is configured to decrease the price of the items available in a limited quantity when the data stored in memory indicates that at least some of remaining inventory of the items available in a limited quantity based on prior sales history is likely to exist at the expiration time.

9. The system of claim 8 further comprising data stored in the memory indicative of a sales history of the items available in a limited quantity.

10. The system of claim 8 further comprising data stored in memory indicative of the expiration time at which it is desired that all of the items available in a limited quantity be sold.

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