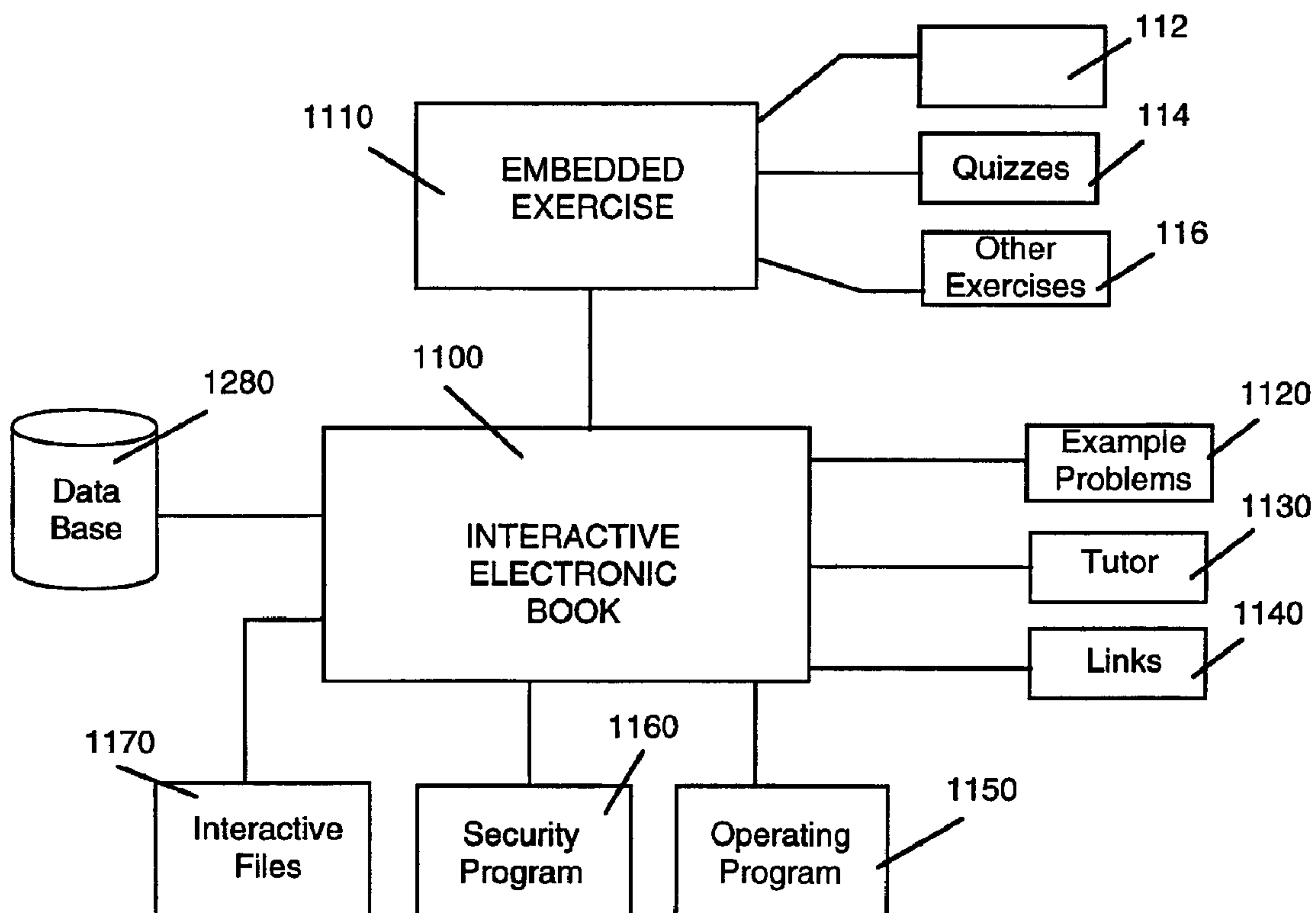




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(54) Title: INTERACTIVE ELECTRONIC BOOK



(57) Abrégé/Abstract:

An interactive electronic book (266) provides a user access to interactive programming. The interactive programming may include interactive files that are linked to the electronic books using electronic links. The electronic links may be included in the text and

(57) **Abrégé(suite)/Abstract(continued):**

graphics data (602) of the electronic book. The interactive files may be located in the same file as the interactive electronic book, or may be located external to the interactive electronic book. External locations include an Internet web site (279), an electronic book viewer (266) and other external locations. Access to the interactive file may be controlled by an operating program and a security program included with the interactive electronic book. The interactive file may include sample problems (1120) and quizzes (114) associated with a college textbook, for example. The interactive files may also include accesses to Internet web sites, and other electronic files to complete purchase orders, answer questionnaires, and to receive other data.

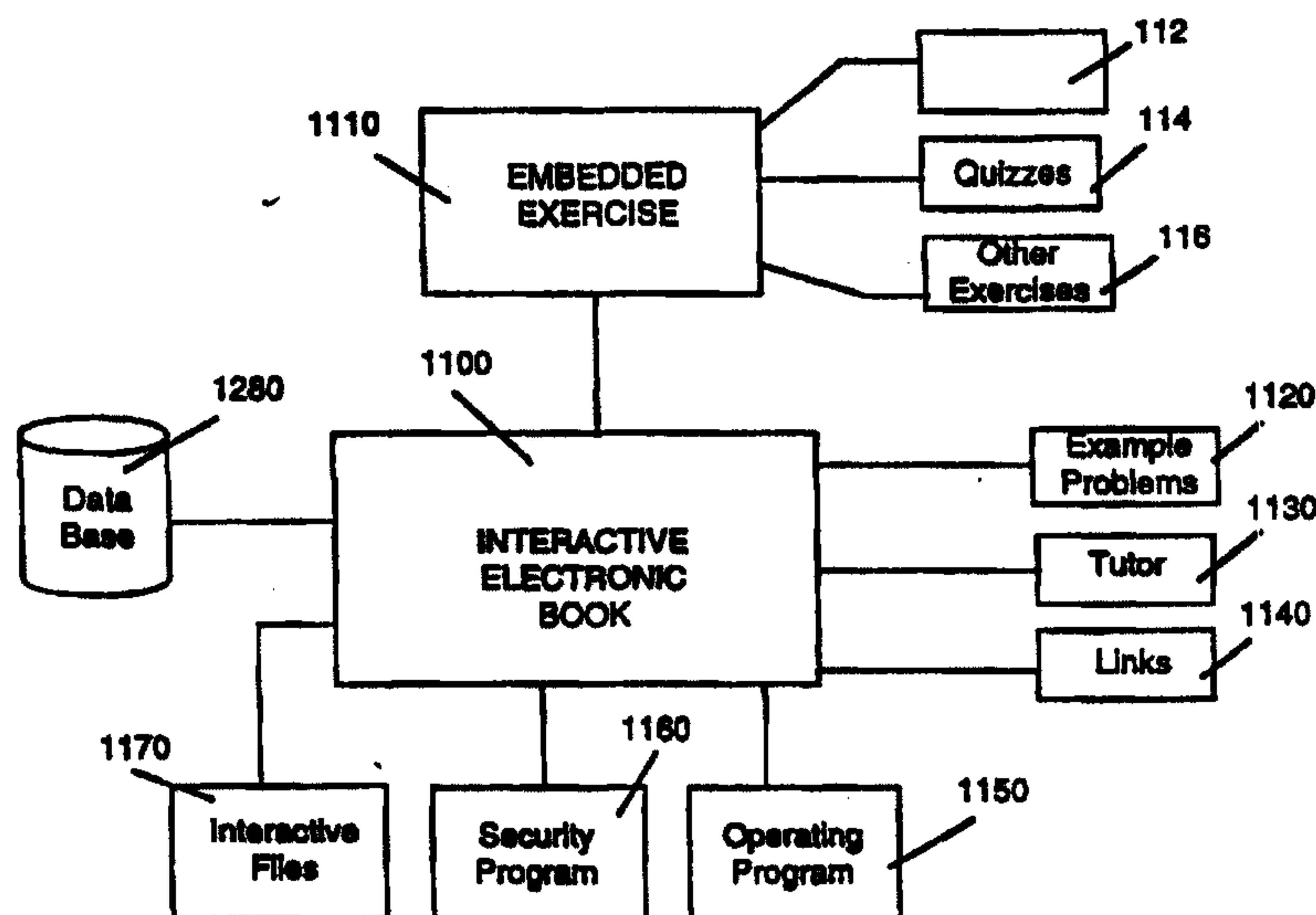
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(54) Title: INTERACTIVE ELECTRONIC BOOK



(57) Abstract

An interactive electronic book (266) provides a user access to interactive programming. The interactive programming may include interactive files that are linked to the electronic books using electronic links. The electronic links may be included in the text and graphics data (602) of the electronic book. The interactive files may be located in the same file as the interactive electronic book, or may be located external to the interactive electronic book. External locations include an Internet web site (279), an electronic book viewer (266) and other external locations. Access to the interactive file may be controlled by an operating program and a security program included with the interactive electronic book. The interactive file may include sample problems (1120) and quizzes (114) associated with a college textbook, for example. The interactive files may also include accesses to Internet web sites, and other electronic files to complete purchase orders, answer questionnaires, and to receive other data.

INTERACTIVE ELECTRONIC BOOK

Technical Field

This invention is directed to an electronic book unit having one or more electronic books. More specifically, the invention is an interactive electronic book.

Background Art

Sparked by the concept of an information superhighway, a revolution will take place in the distribution of books. Not since the introduction of Gutenberg's movable typeset printing has the world stood on the brink of such a revolution in the distribution of text material. The definition of the word "book" will change drastically in the near future. Due to reasons such as security, convenience, cost, and other technical problems, book and magazine publishers are

currently only able to distribute their products in paper form. This invention solves the problems encountered by publishers.

Summary Of Invention

5 An electronic book selection and delivery system is a new way to distribute electronic books to bookstores, public libraries, schools and consumers. The technological breakthroughs of this invention provide a secure system for both delivering selected electronic books and receiving payments. The system has an unusual combination of features that provides the consumer with an electronic book unit that has a high tech aura while being very practical, portable, and easy to use.

10 The clear advantage of the system is that it eliminates the distribution of any physical object such as a paper book or computer memory device from any book or text distribution system. The purchase of an electronic book may become a PAY-PER-READ™ event avoiding the overhead, "middle-men," printing costs, and time delay associated with the current book distribution system. Published material and text such as the President's speech, a new
15 law, a court decision on abortion, or O.J. Simpson's testimony can be made immediately available to the consumer at a nominal fee.

The system is a novel combination of new technology involving the television, cable, telephone, and computer industries. It uses high bandwidth data transmissions, strong security measures, sophisticated digital switching, high resolution visual displays, novel controls, and
20 user friendly interface software.

The primary components of the text delivery system are the subsystem for placing the text onto a signal path and the subsystem for receiving and selecting text that was placed on the signal path. The preferred embodiment of the system includes additional components and optional features that enhance the system. The system may be configured for use by
25 bookstores, public libraries, schools and consumers.

The system for consumer use is made up of four subsystems, namely: (1) an operations center, (2) a distribution system, (3) a home subsystem including reception, selection, viewing, transacting and transmission capabilities, and (4) a billing and collection system.

5 The operations center performs several primary functions: manipulating text data (including receiving, formatting and storing of text data), security encoding of text, cataloging of books, providing a messaging center capability, and performing uplink functions. The system delivers the text from the operations center to consumer homes by inserting text data into an appropriate signal path. The insertion of text is generally performed with an encoder at an uplink site that is within or near the operations center. If the signal path is a video signal path,
10 the system can use several lines of the Vertical Blanking Interval (VBI), all the lines of the analog video signal, a digital video signal or unused portions of bandwidth to transmit text data. Using the VBI delivery method, the top ten or twenty book titles may be transmitted with video during normal programming utilizing existing cable, satellite, wireless or broadcast transmission capability without disruption to the subscriber's video reception. Using the entire video signal,
15 thousands of books may be transmitted within just one hour of air time. Nearly any analog or digital video distribution system may be used to deliver the video signal with included text.

The text data may also be transmitted over other low and high speed signal paths including a telephone network (e.g., a public switched telephone network) having a high speed connection such as an asynchronous digital subscriber line (ADSL) connection.

20 The home subsystem performs four primary functions: connecting to the video distribution system, selecting text, storing text, and transacting through a phone or cable communicating mechanism. The components of the home subsystem may be configured in a variety of hardware configurations. Each function may be performed by a separate component, the components may be integrated, or the capability of existing cable set top converter boxes
25 and televisions may be utilized. Preferably, a connector, library unit and an electronic book unit, or viewer unit, are used. The connector portion of the home subsystem receives the analog video signal and strips or extracts the text from the video. The home library stores the

text signal, provides a user friendly software interface to the system and processes the transactions at the consumer home. The viewer provides a screen for viewing text or menus and novel user friendly controls. The viewer may also incorporate all the functionality of the home subsystem.

5 The viewing device is preferably a portable book shaped viewer which stores one or more electronic books for viewing and provides a screen for interacting with the home library unit. A high resolution LCD display is used to both read the books and to interact with the home library software. An optional phone connector or return-path cable connection initiates the telephone calls and, with the aid of the library, transmits the necessary data to complete the
10 ordering and billing portion of the consumer transaction. The user friendly controls include a bookmark, current book and page turn button. The billing and collection system performs transaction management, authorizations, collections and publisher payments automatically utilizing the telephone system.

 The electronic link system provides links to other electronics files. The other electronic
15 files may be associated with a specific electronic book. Examples include book reviews and Internet databases. The other electronic files may be included as part of a specific electronic book. Examples include links between a Table of Contents or an Index, and the text of the specific electronic book. The other electronic files may be stored in the viewer or home library unit. Examples include a dictionary and a foreign-language translation dictionary.

20 The electronic links may be provided by the content supplier. That is, the operations center, or the book's publisher, may provide additional electronic files, such as the electronic dictionary, and may establish electronic links between the electronic dictionary and the text data of a specific electronic book, for example.

 The electronic links may be subscriber-defined. That is, the subscriber may select a
25 portion of the text of a specific electronic book, and generate a link between the portion and another electronic file. For example, the subscriber may generate a link between a Latin phrase

in a specific book and its English translation in an electronic English dictionary or an electronic Latin-English translation dictionary.

The electronic link may be created using a standard programming language. For example, the links may be generated using Hypertext Markup Language (HTML).

5 A menu system may be provided to assist the subscriber to navigate through different link options.

The electronic links may also link a viewer with an external device or data base. For example, the electronic link may be used to access an Internet web site.

10 Embedded interactive exercises provide for the capture of information that can be used to judge how well the user understands the material read in an electronic book and assists the user to better understand the material by involving the user in interactive exercises. Interactive materials, such as exercises, quizzes, and tests may be provided with an electronic book. Alternatively, interactive materials may be provided independently from the electronic book, and may be available from a remote location such as the Operations Center, an affiliated web
15 site on the Internet, or may be delivered directly to the user and accessed via a message delivery menu. Interactive materials may take the form of questions with free form answers, questions with multiple choice answers, pre-formatted forms with fields to be completed, and multi-part exercises that are revealed progressively to the user as the user completes each prior part of the exercises. In this way, the user may be forced to complete an exercise in a
20 prescribed sequence, where hints can be revealed along with the way to guide the user to successful completion of the exercise.

For example, to complete an exercise, the user interacts with the viewer in one of two ways. First, where all possible selections available to the user are pre-defined, the cursor ball is used to move the cursor and the selection button is used to make a selection. Second, for
25 exercises that require the entry of limited free-form text, an on-screen keyboard is presented and the keys to be pressed are indicated through the use of the cursor ball and selection key of the viewer. Alternately, a remote keyboard may be used.

Completed exercises may be stored in memory in the viewer for future printing by the Library Unit or the completed exercises may be stored in memory in the viewer for future electronic transmission to a collection site by the viewer or Library Unit using an outgoing menu feature. In this manner, completed exercises may be submitted for grading.

5 Otherwise, the completed exercises may be deleted.

An additional timing function allows for the initiation of a time clock for exercises, time-stamping the start-time and end-time of the user's effort. The viewer's internal time clock may be used as a timing reference. Exercises may also be created where the initiation of the exercise requires the entry of a password. The password may be provided
10 through an external path, for example, retrieved from a professor's web site, or delivered to the user and accessed via the message delivery menu. Passwords may be set up so that they may only be used once, prohibiting the user from accessing an exercise multiple times prior to completing it officially for a grade.

In one aspect, the present invention provides an electronic book viewer having a
15 display for displaying an interactive electronic book and an associated interactive file, the viewer comprising: a data storage device having stored thereon the interactive electronic book, the interactive electronic book comprising: text and graphical data, an electronic link coupled to the text and graphical data and to the interactive file, wherein the interactive file is located in a file remote from the interactive electronic book; and a
20 control program coupled to the electronic link, wherein the control program activates the electronic link to access the interactive file.

In a further aspect, the present invention provides an interactive electronic book system comprising: an operations center that provides an interactive electronic book, comprising: a data combiner that combines text and graphical data, and electronic links to
25 produce the interactive electronic book, a digital compression unit for compressing the interactive electronic book to produce compressed data, and a transmitter for transmitting the compressed data to a remote location; an electronic book viewer, comprising: a receiver for receiving the compressed data from the remote location, a decompressor for decompressing the received data, a memory for storing the decompressed data, a processor
30 for processing the stored data, and a display for displaying the processed data as the interactive electronic book; and interactive files linked to the interactive electronic book

6a

by the electronic links, wherein the interactive files are stored in a file remote from the interactive electronic book.

In yet a further aspect, the present invention provides a method for producing an interactive electronic book, the method comprising: creating an electronic book file, the
5 electronic book file comprising: electronic text and graphics data, an electronic link, wherein said electronic link is coupled to the text and graphics data, and a control program coupled to the electronic link; creating an interactive file; storing the interactive file in a location remote from the electronic book file; associating the interactive file to the electronic book file.

10 Brief Description Of Drawings

The invention will be described with reference to the following drawings, wherein like numerals refer to like elements, and wherein:

Figure 1 is a block diagram of the primary components of the electronic book selection and delivery system;

15 Figure 2 is a schematic showing an overview of the electronic book selection and delivery system;

Figure 3a is a schematic of the delivery plan for the electronic book selection and delivery system;

Figure 3b is a schematic of an alternate delivery plan;

20 Figure 4 is a block diagram of an operations center;

Figure 5a is a flow diagram of the processing at the operations center and uplink;

Figure 5b is a block diagram of the hardware configuration for an uplink site;

Figure 6a is a block diagram of the hardware configuration for a four component home subsystem;

Figure 6b is a schematic of a two unit home subsystem;

Figure 7 is a flow diagram of the processes performed by the video connector;

5 Figure 8 is a block diagram for an example of a library unit;

Figure 9 is a flow diagram of some of the processes performed by the library on the received data stream;

Figure 10 is a flow diagram of the processes performed by the library unit on information requests from the viewer;

10 Figure 11 is a block diagram showing the components for an example of a viewer;

Figure 12 is a flow diagram of some of the processes performed by the viewer on an information request from a subscriber;

Figure 13 is a chart depicting the menu structure and sequencing of menus in the menu system;

15 Figure 14a is a schematic of an introductory menu;

Figure 14b is a schematic showing an example of a main menu;

Figures 14c, 14d, 14e, 14f, 14g, 14h, 14i, 14j and 14k are schematics showing examples of submenus;

20 Figures 15a and 15b are a diagrams of an electronic book system for a bookstore, or school or public library;

Figures 16a and 16b are schematics of hardware modifications or upgrades to a set top converter;

Figure 17 is a schematic showing a set top terminal that includes a data receiver and data transmitter;

25 Figure 18a is a schematic of a book-on-demand system;

Figure 18b is a schematic of an operations center supporting a book-on-demand system;

Figure 19 is a schematic of a page of an electronic book having electronic links;

Figure 20 is a schematic of a page of an electronic book with the electronic links shown;

Figure 21 is a schematic of a show links submenu;

5 Figure 22 is an example of links in an electronic book;

Figure 23 is a logical diagram of an interactive electronic book and associated software;

Figure 24 is a logical block diagram of an embedded exercise;

Figure 25 is a logical block diagram of another embedded exercise;

10 Figures 26a - 26c is a flowchart illustrating operation of the embedded exercise shown in Figure 25; and

Figure 27 is a flowchart illustrating detection and display of an interactive element in an electronic book.

Disclosure Of Invention

15 The primary components of the electronic book selection and delivery system 200 are an encoder 204, a video distribution system 208, a connector 212, and a text selector 216 as shown in Figure 1. The encoder 204 places textual data on a video signal to form a composite video signal. Although the composite signal may contain only textual data, it usually carries both video and textual data. A variety of equipment and methods may be used to encode text
20 data onto a video signal. The video distribution system 208 distributes the composite video signal from the single point of the encoder 204 to multiple locations which have connectors 212. The connector 212 receives the digital or analog video signal from the video distribution system 208 and separates, strips or extracts the text data from the composite video signal. If necessary, the extracted text data is converted into a digital bit stream. Text selector 216
25 works in connection with the connector 212 to select text.

Using a connector 212 and text selector 216 combination, various methods of selecting and retrieving desired text from a composite or video signal are possible. Text may be

preselected, selected as received or selected after being received and stored. The preferred method is for the connector 212 to strip or extract all the text from the video signal and have the text selector 216 screen all the text as received from the connector 212. The text selector 216 only stores text in long term or permanent memory if the text passes a screening process described below.

An overview of the electronic book selection and delivery system 200 is shown in Figure 2. The delivery system 200 includes: an operations center 250 including an uplink site 254, a video distribution system 208, a home system 258 including a video connector 212, a library 262, a viewer 266, and a phone connector 270, telephone system 274, Internet web sites 279 and 279', an intranet 281, and a billing and collection system 278. Also as shown in Figure 2, the home system 258 may include connections to a television 259 and a personal computer 261. The television 259 and the personal computer 261 may be used to display menu screens, electronic books, electronic files, or any other information associated with the delivery system 200. In addition, the television 259 and the personal computer 261 may provide control function that replicate and supplement those of the viewer 266.

The operations center 250 receives textual material from outside sources 282 such as publishers, newspapers, and on-line services. Alternately, the outside sources may maintain electronic books at the Internet web site 279. The outside sources 282 may convert textual and graphical material to digital format, or may contract with another vendor to provide this service. The operations center 250 may receive the textual and graphical material in various digital formats and may convert the textual material to a standard compressed format for storage. In so doing, the operations center 250 may create a pool of textual material that is available to be delivered to the home system 258. The textual material may be grouped by books or titles for easy access.

As used herein, "book" means textual or graphical information such as contained in any novels, encyclopedias, articles, magazines or manuals. The term "title" may represent the actual title assigned by an author to a book, or any other designation indicating a particular group,

portion, or category of textual information. The title may refer to a series of related textual information, a grouping of textual information, or a portion of textual data. For example, "Latest Harlequin Romance", "Four Child Reading Books (Ages 10-12)", "Encyclopedia 'BRITANNICA'™", "President's Speech", "Instruction Manual", "Schedule of 4th of July Events", "Pet Handbooks", "Roe v. Wade", and "The Joy of Cooking" are suitable titles. Also, the title may be a graphical symbol or icon. Thus, a picture of a wrench may be a title for a repair book, a picture of a computer a title for a computer book, a graphical symbol of a telephone a title for a telephone book, a drawing of a dagger a title for a mystery book, a picture of a bat and ball a title for a sports book and a picture of tickertape a title for a business book. The term "electronic book" refers to the electronic counterpart to a "book," i.e., an electronic file. The term "interactive electronic book" refers to an book-counterpart electronic file with interactive features.

The operations center 250 includes an uplink site 254 for placing the text onto a video signal and sending the composite video signal into a video distribution system. The uplink site 254 would generally include an encoder 204 (not shown in Figure 2) to encode the text onto a video signal.

Many analog and digital distribution systems 208, or other telecommunications systems, can be used with the delivery system 200, such as a cable television distribution system, a broadcast television distribution system, video distributed over telephone systems, distribution from the Internet, direct satellite broadcast distribution systems, and other wired and wireless distribution systems.

The home system 258 performs five primary functions: (1) connecting with a video distribution system, (2) selecting data, (3) storing data, (4) displaying data, and (5) handling transactions. An important optional function of the home sub-system 258 is communicating using a telephone communication system 274. The home system 258 is made up of primarily four parts: a video connector 212 or similar type of connector for connecting with the video distribution system 208, a library unit 262 for storing and processing, an electronic book, or

viewer unit, 266 for viewing menus and text and a telephone connector 270 for connecting with a telephone communications system 274. In an alternate arrangement, the viewer 266 may include all the functionality of the home system 258.

5 The billing and collection system 278 may be co-located with the operations center 250 or located remote from the operations center 250. The billing and collection system 278 is in communication with the home system 258 via telephone-type communication systems (for example 274). Any of a number of telephone type communication systems, such as, a cellular system, will operate with the billing and collection system 278. The billing and collection system 278 records the electronic books or portions of text that are selected or ordered by the
10 subscriber. The collection system will charge a subscriber's credit account or bill the subscriber. In addition, the billing and collection system 278 will monitor that amount due to publishers or other outside sources 282 who have provided textual data or other services such as air time to enable the text delivery system 200 to operate.

When electronic books are provided via the Internet web site 279, the billing and
15 collecting functions may be incorporated into the Internet web site 279. For example, a subscriber may pay for an electronic book selection by entering a credit card number into a data field of a page of the Internet web site 279. In this configuration, a separate billing and collection system may not be required.

The Internet web site 279' may be used in conjunction with the home system 258 to
20 provide additional functionality. For example, the Internet web site 279' may be a college professor's Internet web site that is used to post examinations for use with an interactive electronic book, and at which the students may post completed examinations, for example. The Internet web site 279' may also be a chat room, bulletin board, or news group site that is used to communicate information related to one or more electronic books.

25 The intranet 281 may be a local network linking together a number of related users. For example, a university may establish an intranet for its students. Connections may be provided in dormitory rooms, or through use of an interface device for off-campus students.

The intranet 281 may include a connection to the university's library so that electronic books maintained by the university may be provided to the students. The intranet 281 may also include web sites for the university's professors, similar to the Internet web site 279'. In this case, all the functionality of the Internet web site 279' would be included in the web sites in the intranet 281.

Figure 3a is an expanded overview of a delivery plan 301 for the delivery system 200. The delivery plan 301 supports various types of subscribers and various billing systems. Figure 3a shows that publishers 282 will provide text transfer 302 to the operations center 250' and receive payments 306 from the billing and collection system 278'. A separate channel uplink site 254' is shown in this configuration receiving data 310 from the operations center 250'. The operations center 250' has three separate sections (318, 322, 326) one for text receiving, formatting and re-entry 318, a second for security encoding 322 and a third section for catalog and messaging center functions 326.

The billing and collection system 278' shown has two sections (330, 334) one for transaction management, authorizations and publisher payments 330, and the other for customer service 334. The customer service section 334 provides for data entry and access to customer account information. Transaction accounting information 338 is supplied to credit card companies 342 by the transaction management section 330 of the billing and collection system 278'. The credit card companies 342 provide billing 346 to customers either electronically or by mail.

Three methods for communicating between the subscriber base 348 and the billing and collection system 278' are shown: by telephone switching 350 alone, cellular switching 354 and telephone switching 350 combined, and by use of the cable system 358 and the telephone switching 350. The system shown supports both one-way 362 and two-way cable communication 366 with subscribers. Public libraries and schools 370 as well as bookstores 374 may use the delivery system 301.

Public libraries and schools 370 would have a modified system to allow the viewer 266 to be checked-out or borrowed while bookstores 374 would rent or sell the viewer 266 and sell the electronic books. The bookstores 374 as well as the public libraries and schools 370 may be serviced by cable 378. Optional direct broadcast systems (DBS) 382 can also be used with the delivery system 200. The DBS 382 may provide the electronic books using digital satellite technology, with the electronic books being received via a backyard satellite antenna, for example.

Figure 3b is an alternate delivery plan 301' that provides for electronic book selection and delivery using the Internet. In Figure 3b, the publishers 282 provide the electronic books to be posted at the Internet web site 279. The publishers may convert the text and graphical data to digital format, compress the digital data, and upload the compressed digital data to the Internet web site 279. Alternately, the publishers 282 may arrange for an outside conversion activity 283 to convert the text and graphical data to digital format. The conversion activity 283 may then provide the digital data to the Internet web site 279. For example, a large on-line bookstore could gather publications in electronic form from a variety of publishers, or could convert hard-copy books to electronic form, and post the electronic books on the Internet such as at the Internet web site 279.

The electronic books may then be transferred via a public switched telephone network (PSTN), for example, direct to a subscriber 285, a library 286 and a bookstore 287. The library 286 and the bookstore 287 may also provide electronic books to the subscriber 285.

I. The Operations Center

Figure 4 is a schematic of an operations center 250 which includes an uplink 254. The operations center 250 gathers text or books by receiving, formatting, storing, and encoding. A data stream 302 containing text is received at the operations center 250 by a data receiver 402. The data receiver 402 is under the control of a processor 404. After reception, the data stream is formatted using digital logic for formatting 406 which is also under the control of the processor 404. If any additional text is being generated at the operation center 250 locally for

insertion into the distributed signal, the text generation is handled through text generator hardware 410 which may include a data receiver and a keyboard (not shown). Following processing by the text generator 410, the additional text can be added to the text received by the combining hardware 414 that includes digital logic circuitry (not shown).

The processing at the operations center 250 is controlled by a processor 404 which uses an instruction memory 416. The processor 404 and instruction memory 416 may be supplied by a personal computer or mini-computer. To perform the catalog and messaging functions, the operations center 250 uses a catalog and message memory 420 and the text generator 410 if necessary.

The data stream of text, catalog and messages is preferably encoded by security module encoding 424 prior to being sent to the uplink module 254. Various encoding techniques may be used by the security encoding module 424 such as the commercial derivative of NSA's encryption algorithm (Data Encryption System (DES)) and General Instrument's DigiCipher II™. Following encoding, the encoded text may be stored in text memory 428 prior to being sent to the uplink 254. A first-in-first-out text memory arrangement may be used under the control of the processor 404. Various types of memory may be used for the text memory 428 including RAM. The operations center 250 may use file server technology for the text memory 428 to catalog and spool electronic books for transmission as is described below.

To transmit textual data (i.e., electronic books), the delivery system 208 uses high bandwidth transmission techniques such as those defined by the North American Broadcast Teletext Standard (NABTS) and the World System Teletext (WST) standard. Using the WST format (where each line of the Vertical Blanking Interval contains 266 data bits), a four hundred page book, for example, may be transmitted during programming using four lines of the Vertical Blanking Interval at a rate of approximately one book every 1.6 minutes (63,840 bits per second). Alternatively, electronic books may be transmitted over a dedicated channel, which interrupts programming so that 246 lines of video can be used to transmit approximately 2,250

books every hour (3.9 Mbits per second). A teletext type format is the simplest but possibly the slowest text format to use with the delivery system 200. In either event, an encoder 204 is utilized at an uplink site 254 to insert textual data into the analog video signal. In many other respects, the delivery of the textual information is completed using existing cable television plant and equipment.

Figure 5a is a flowchart of the steps involved in processing text from the publisher or provider 282 that occurs at the operations center 250. As shown in block 500, the publisher 282 processes data files of text for books, compresses, encrypts and sends the data files to the operations center 250 or uplink 254. Text files for books are preferably sent one book at a time. As shown in block 504, the uplink 254 or operations center 250 receives and processes the data stream from the publisher 282. Generally, part of this processing includes encryption and error correction.

As shown in block 508, files are broken into smaller packets of information. Header information is added to the packets. The bit stream is converted from a serial digital bit stream to an analog bit stream that is compatible with an NTSC video signal. Block 512 shows the switching of analog data into the video lines of a video signal. The analog data is generally placed either in the VBI or the active video lines. In some instances, it may be preferable to utilize unused portions of bandwidth (such as 5-40 MHZ, 70-75 MHZ, 100-109 MHZ or other guard bands) instead of the video lines.

Figure 5b is an example of a hardware configuration to perform some of the functions for blocks 508 and 512. A video feed 516 is received and processed through a sync stripper 520. The stripped sync signal 532 is used by the digital logic control 524. The digital logic control 524 receives the sync signal 532 and a serial digital bit stream 528 for processing. The digital logic control 524 passes the serial digital bit stream to the Digital to Analog converter 536 and outputs a control signal 540 for the video switch 544. The video switch 544 integrates the video feed 516 and analog data stream 548 into a video feed with analog data signal inserted 552.

As an alternative to cable, satellite, broadcast, or other television delivery methods, the public telephone system may be used to transmit books to the subscribers. An average electronic book would take about 7 minutes to transmit over the public telephone system. Using the telephone system, it is not necessary to combine video and text into a composite
5 signal. In most other respects, the operation center would remain similar whether text delivery was by telephone or cable. File server technology (such as that described in U.S. Patent No. 5,262,875, entitled AUDIO/VIDEO FILE SERVER INCLUDING DECOMPRESSION/PLAYBACK MEANS, issued to Mincer, et al., and, U.S. Patent No. 5,218,695, entitled FILE SERVER SYSTEM HAVING HIGH-SPEED WRITE
10 EXECUTION, issued to Noveck, et al., may be used at the operation center with a telephone system text delivery method.

As another alternative to cable, television, and telephone system delivery, the public telephone system may be used to provide access to the Internet, where the Internet web site
15 279 may be accessed. Electronic books may be ordered, paid for, and delivered directly from the Internet web site 279 over the telephone system.

In any delivery system using the telephone system, individual subscribers may increase the electronic book deliver rate by incorporating high speed modems or other communication devices such as an Integrated Services Digital Network (ISDN) connector, or by use of an Asymmetric Digital Subscriber Line (ADSL)

20 II. The Home System

The hardware configuration for a four component home system 258 is shown in Figure 6a. Figure 6b shows a hardware configuration for a two component home system. The hardware components may also be incorporated into a single unit that communicates with a terminal in a television delivery system or with a telephone system by use of a modem, for
25 example. The home system 258 performs several functions, such as receiving data and video transmissions, stripping (or extracting) the data from the video signal, screening and storing the data, providing user friendly interface controls and software, displaying menus and text,

processing transactions, initiating telephone calls and transmitting billing data. Various hardware configurations may be utilized to achieve the desired functions of the home system 258. For example, as shown in Figure 6b, the home system 258 can be configured to utilize the reception and channel tuning capability of the current installed subscriber base of cable converter boxes and televisions 601. The home system 258 can also be designed as an advanced set top terminal converter box with menu generation capability, electronic memory and a telephone modem as described in section V below.

The electronic components which make up the home system 258 can be arranged in a variety of ways. In the four unit system of Figure 6a the viewer 266 and library unit 262 are wired together via a signal path 615 while the remaining components communicate through RF transceivers 604. Alternatively, the viewer 266 and the library unit 262 may communicate using RF signaling over wireless path 615'.

Also shown in Figure 6a is an auxiliary data device 269, connected to the viewer 266, which may be a hand-held calculator or a separate disk drive or other data storage device, for example. A printer 265 may be connected to the viewer 266 and/or the library unit 262.

In a simple version of the home system 258 there are only two units, the library unit 262 and a viewer 266. Figure 6b shows a two unit home system 258 with certain optional features. Finally, all the functionality of the home system 258 may be incorporated into one electronic book unit, or viewer.

The viewer 266 is generally equipped with a high resolution viewing area 602, digital logic (including a key 605, security 606, and a microprocessor 621), video graphics control and memory 607, power supply circuitry 602 (not shown), an optional battery 603 and an optional RF transceiver 604. In a two unit arrangement, the library unit 262 contains the connector function to the video distribution system 208, connector function to a public telephone communications system, and memory 600 (which may be removable and portable 600'). More specifically, the library unit 262 would include data stripping functions 617, digital logic 609, memory storage 600, power circuitry 610, optional telephone connections 611

(including cellular or PCN 611'), optional battery (not shown), optional tuner module 613 and an optional RF transceiver 604. The video connector 212 and the public telephone system connection 270, as well as the removable portable memory unit 600 of the library unit 262 may be broken out into separate components. (Figure 6b shows a removable portable hard disk memory 600' with removable cartridges 614.) The home system 258 may include an attached
5 keyboard 267 or a wireless keyboard 268. Both the attached keyboard 267 and the wireless keyboard 268 may be used to communicate with the viewer 266 (not shown) or the library unit 262. The viewer 266 may also receive data from auxiliary data source 269 including a programmable, hand-held calculator and a separate disk drive or other data storage device, for example. The viewer 266 may output data and text, such as a portion of the electronic
10 book to the printer 265 or other display device.

The wireless keyboard 268 may communicate via radio frequency (RF) signaling, for example. Therefore, the home system 258 may have as many as six separate components which communicate with each other. The two, three, four, five or six separate components
15 which make up the home system 258 can communicate with each other in a variety of ways, including hardwired connection 615, RF transceiver 604, and other wireless methods.

RF communications are preferred in the home because they allow separate components to be located throughout the home without restriction. The data communicated between the units is preferably secure data. In addition, the library unit 262 may provide power to the
20 viewer 266 through the hardwired connection 615.

Alternatively, a single unit may perform all of the home system 258 functions. The single unit should use light-weight materials, including a light-weight battery. A single unit eliminates the need to communicate (externally) between units. The single unit is less expensive and eliminates duplicative processing, memory storage and power circuitry.

25 To receive and strip the data from the video signal at the consumer's home, either a cable interface device or cable connector 212 is used. The cable connector device includes a tuner 613, while the cable interface device makes use of existing tuning equipment in the

home. In either configuration, data is stripped from the video signal and stored at the subscriber's location in the library unit 262. The phone connector 270, and modem 611 initiate telephone calls and transmit ordering and billing information to the operations center 250 or billing and collection system 278. Alternatively, the phone connector 270 and the modem 611
5 may be used to provide access to the Internet to order and receive electronic books from an Internet web site. A digital connector 619 is provided to communicate digital information with the set top 601. The library unit 262 is the intelligent component of the home system, incorporating the hardware and software necessary to store the text data, generate menus and effect the purchase transactions. In addition to an RF transceiver 604, the library unit 262 also
10 includes the necessary jacks and connections to allow the delivery system 200 to be connected to the viewer 266. As shown in Figure 6b, the library 262 communicates the text data (electronic book) to the viewer 266 in a secure format which requires a key 605 for decryption. The text is generally only decrypted page by page just before viewing.

a. The Video Connector

15 Figure 7 shows the flow of the processes performed by the video connector 212. The video connector receives the video signal 608, tunes to the channel containing the text data 612, strips the text data from the video signal 616, and communicates the text data stream to logic components in the library 620.

The connection to the video distribution system is preferably a cable connector to a
20 cable television delivery system, as shown in Figure 6b. The cable connector includes a data stripper circuit 617, which accepts video input from either a set top converter, TV or VCR 601, or an optional tuner block 613 that receives the CATV signal through the cable connector 212'. The data stripper circuit 617 strips data out of the video, and outputs a digital bit stream to the digital logic portion 609 of the library unit 262. The data is embedded in the video signal
25 either in the vertical blanking interval or the active video portion in an encrypted and compressed format. The data stripper circuit 617 can be placed inside the set top converter

box 601, TV, or in the library unit. The data stripper circuit 617 outputs the digital bit stream to be used by the library digital logic 609.

The video connector 212 may also contain a channel tuner module 613 that can tune to the video channel and provide access to the video that contains the data to be stripped.

5 Using the optional tuner module 613, a set top converter, VCR, or TV tuner is not needed in the home system. The optional tuner module 613 would instead receive the CATV signal directly through the cable connector 212.

b. Library

An embodiment of the library unit 262 for a two unit home system 258 is shown in both

10 Figure 6b and Figure 8. The embodiment shown includes the following optional parts: the video connector 212, phone connector 270, RF transceiver 604, and battery pack 624 in addition to a removal portable memory 600', microprocessor 628, instruction memory unit 632, digital logic 636, and power unit 640.

The library unit 262 contains a digital logic section 609 (not shown in Figure 8) which

15 includes the microprocessor 628, the digital logic 636 and the instruction memory unit 632. The microprocessor 628 is preferably a secure microprocessor such as the Mot SC21 device sold by Motorola. The digital logic section 609 will receive the serial digital bit stream from the data stripper circuit 617 and process the data. Error correction will also be performed by the digital logic section 609 and the data will be checked for proper address. If the address of the

20 data is correct and the library unit 262 is authorized to receive the data, the data will be transferred to the memory storage unit 600, 600'. Authorization to receive the data is provided by the cable headend or another distribution point. An authorization code may be sent in the serial digital bit stream. The digital logic section 609 will send appropriate text and graphical data to the memory storage unit 600, 600'. It transfers this data in a compressed and

25 encrypted format and the data remains stored in a compressed and encrypted format.

i. Memory Storage Unit

The memory storage unit of the library may be a removable portable memory unit 600' (as shown in Figures 6a, 6b and 8). A variety of options are available for memory storage: a hard disk drive, a hard disk with removable platters, and a CD ROM. Referring to Figure 5 6b, a hard disk drive unit 600' which contains removable platters may also be used. This would provide virtually unlimited library storage capacity. Data (i.e., electronic book files) may be stored in the memory storage unit in a compressed and encrypted format. As is also shown in Figure 6b, the data may also contain a key or unique ID number that matches the ID or key of the viewer 266. This matching of a unique key or ID number prevents unauthorized transfer 10 of text data from the memory storage unit to an unauthorized viewer. Small memory devices such as smart cards, electronic memory cards or PCMCIA cards (personal computer memory card industry association) may also be used to store the data.

ii. Power Circuitry

As shown in figures 6b and 8, the library unit 262 may accept power from either AC 15 wall power 610, DC power 640, or optional battery power 624. The power circuitry 610, 640 may provide all the voltage necessary from either the battery 624 or AC unit for the various circuitry in the library. The power circuitry 610, 640 may also provide power to the viewer 266 through a single data cable when connected to the viewer. The power circuitry 610, 640 will recharge the battery using AC power when in operation. With the optional 20 battery unit 624 installed, the library unit 262 becomes a portable unit and can still provide power to the viewer 266. In order to extend battery life, power conservation measures may be utilized, such as shutting down the memory system when not in use. When the viewer 266 is being utilized and the library circuitry is not being utilized, virtually all power may be shut down to the library unit 262.

25 iii. Connection to the Public Telephone System

The connection to the telephone system may be provided by a modem 611. Various available modems may be used to perform this function. As shown in Figure 6b, cellular phone

or PCN phone connections 611' may also be provided. When the home system 258 is first initialized, the modem may be used to transfer the name and credit card information of the consumer to the billing and collection system 278. The telephone connection 270 may be utilized each time an electronic book is purchased by a consumer to complete and record the transaction. The telephone connection 270 may also be used as a means for receiving the electronic books from the operations center 250 or from an Internet web site, by-passing the video distribution system 208. The phone connection 270 may be a separate unit as shown in Figure 6b.

iv. Library Processing

Figure 9 shows an example of some basic processing performed by the library unit 262 on the data stream 651 received from the video connector 212 or stripper circuit 617. First the data stream 651 is checked for error correction by block 650. If an error is detected, block 654 de-interleaves the data followed by block 658 running a FEC (Forward Error Correcting) algorithm. The combination of block 650, 654 and 658 perform the error correction needed on the data stream. If no error correction is necessary the data proceeds to block 662 where packets are individually checked for packet address. If the address is a unique address, block 666 checks whether the address of the packet matches the library box ID number. The library box ID number is a unique number associated with that library unit 262 which is used to ensure security of the data. Block 670 determines whether an electronic file has already been opened into which the data packet can be saved. If no data file has been opened then block 674 opens a new data file for that packet. If an electronic file has been opened, then the packet is saved in that electronic file on disk, block 678. Next, the process checks to see if this is the last packet for a particular book for a particular textual data block being received 682. If it is the last packet of information, then the electronic file is closed and the directory of available electronic files is updated 686. Following either block 682 or 686, the process returns to receive another data packet from the data stream received from the data stripper block.

If the packet address is checked and the address is determined to be a broadcast address, the process determines the type of message that is being sent 690. The message may be an index of book titles, menu (and menu graphics) information, announcements, special offerings, discounts, promotions, previews etc. The message is then stored in appropriate electronic message file 694 and the process is returned to block 650 to receive another data packet and perform another error check.

Using the process of Figure 9, the library unit 262 is able to receive, store and update directories related to the textual data and graphical data (that can be used to depict pictures in a given book or to generate menus). Variations of the processes are possible depending on the format of the data and operating system of the library unit 262.

Figure 10 shows an example of the processing of information requests from the viewer 266 at the library unit 262. Information requests from the viewer 266 are received either through the cable connecting the viewer 266 to the library unit 262 or through wireless transmissions such as RF. It is possible in some embodiments for subscribers' requests to come from a set top converter box 602 (see Section V).

Information requests received from the viewer 266 generally fall into three categories: (1) directory data of electronic books stored in the library unit 262, (2) index of all available electronic books on the system, and (3) requests for a specific electronic book (Block 700). Process block 704 answers a request from the viewer 266 for a directory of data showing the electronic books stored at the viewer 266. The directory of data is sent to the viewer 266 so that it may be displayed to the subscriber. Process block 708 handles requests from the viewer 266 for an index of all available electronic books on the home system 258. The library unit 262 will obtain an index of all the available books on the system and transmit that index, process 712, with menu information to the viewer 266. Process block 716 replies to a request from the viewer 266 for a specific electronic book. The library unit 262 opens an electronic file for the specific electronic book requested by the viewer 266 and transmits the record or transmits the information 720 on a packet-by-packet basis to the viewer 266. This process of

transmitting the specific electronic book, record, or packets to the viewer 266 continues until the last record or packet has been sent, 724.

In addition to the processes shown in Figure 10 in handling a request for a specific electronic book, the library unit 262 also orders and receives specific electronic books from the operations center 250 using the process as described in process block 716. Following a request for a specific electronic book which is not stored at the library unit 262, the library unit 262 will proceed to determine the next available time the electronic book will be on the video distribution system 208 and ensure reception and storage of that electronic book (process not shown). In performing this process the library unit 262 will transmit to the viewer 266 information on when it will obtain the text data for the electronic book so that the subscriber may view the electronic book. In addition to timing information, price and other ordering information may also be passed by the library unit 262 to the subscriber.

c. The Viewer

Figure 11 is a block diagram of the viewer 266 showing its internal components. The viewer 266 of Figure 11 is similar to the viewer 266 depicted in Figure 6b. The viewer 266 is designed to physically resemble a bound book. The viewer 266 is made up of five primary components and six optional components: (1) LCD display 602, (2) digital circuitry (not shown), (3) video graphics controller 607', (4) controls 740, (5) book memory 728, (6) optional power supply circuitry 736, (7) optional battery 603', (8) optional RF transceiver 604, (9) optional cellular or mobile communicator (608), (10) optional keyboards 267 and 268, and (11) a speaker/microphone 608'.

(1) A high resolution LCD screen 602, preferably of VGA quality, is used by the viewer 266 to display text and graphic images. The screen is preferably the size of one page of a book. A two page screen or two screens may also be used with the viewer 266.

(2) Digital circuitry that includes a secure microprocessor 621, instruction memory 732, and digital logic. Data is transferred to the viewer 266 in compressed and encrypted format. The secure microprocessor 621 compares the ID number of the viewer 266 with the

incoming data stream and only stores the text data if the ID number of the viewer 266 matches that within the incoming data stream. It is preferred that the viewer 266 not output text data or other data and that the data is decompressed and decrypted only at the moment of viewing and only for the current page being viewed. These measures are preferred because they provide additional security against unauthorized access to data.

(3) A video graphics controller 607' that is capable of assisting and displaying VGA quality text and graphic images is included in the viewer 266. The graphics controller 607' is controlled by the digital circuitry described above. Text may be displayed in multiple font sizes.

(4) The viewer 266 of Figure 11 has touch panel controls 740. These unique and novel controls 740 allow the consumer to select stored electronic books and electronic books from catalogues, move a cursor, and turn pages in a book. Typically, the preferred controls 740 include forward and reverse page buttons 742, 741, a ball (or trackball) 743 for cursor movement, one or more selection buttons 745, a current book button 747 and a bookmark button 749 (see Figure 14a).

The controls 740 should be easy to use and conveniently located. Referring to Figure 14a, the controls for the viewer 266 may be located below the screen 602 at the bottom portion of the viewer 266. The next page turn button 742 is the most used button 740 and may be located towards the right edge of the page. The subscriber is likely to use right hand thumb movements to work the controls particularly the page turn buttons 741, 742. Therefore, it is preferred that the buttons be arranged in such a manner that the buttons are easily controlled by a subscriber's right thumb. Generally, this can be accommodated either on the lower portion of the viewer 266 (as shown) or along the right hand margin of the viewer 266 (not shown). The current book button 747 and bookmark button 749 are usually the least used of the controls 740. Therefore, in the example shown those buttons 747, 749 are located on the inside portion towards the binder of the viewer 266.

Locating the ball 743 or other cursor movement device (such as four pointer arrows -- not shown) in the bottom center of the viewer 266 is both easier for the subscriber to use and easier in manufacturing the viewer 266. The selection buttons for the cursor 745 are preferably located below the middle diameter of the cursor ball 743 on the right and left sides of the ball as shown. If pointer arrows are used for cursor movement, a selection button 745 may be located in the center of the four arrow buttons (not shown). Again, the most used controls should be located where a subscriber's right hand thumb would normally rest.

(5) Book memory 728 for at least one electronic book or more of text is included in the viewer 266. The memory 728 stores text and any graphics which represent pictures in a book. The memory 728 can also store menu graphics data. Two different memory 728 devices may be used in the viewer 266, one for the instructions for the microprocessor 621 in the digital circuitry and a second type of memory may be used for the book memory 728 (and graphics). Various memory devices available on the market may be used such as, ROM, RAM or a small hard disk. Since an electronic book requires approximately 0.6 megabytes of storage, a small hard disk providing approximately 60 MBytes of storage provides memory to store approximately 100 electronic books. The large hard disk drives currently available allow for storage of thousands of electronic books.

Text for books may be displayed in various font sizes. To accommodate various fonts for display, a variety of fonts are stored in instruction 732 or book memory 728. Thus larger or smaller fonts may be recalled from memory 621, 728 to create displays desired by the subscriber.

(6) Power supply circuitry 736 in the viewer 266 will accept power from either an AC power source or from an optional battery 603', or the library unit 262. The power supply circuitry 736 provides the necessary voltages to accommodate the various systems within the viewer 266.

(7) An optional battery 603' is provided in the preferred embodiment. The battery 603' is automatically recharged when AC power is available.

(8) An optional RF transceiver 604 which provided two-way data link between the viewer 266 and other components of the home system 256 can also be included in the viewer 266.

5 (9) Also, the viewer 266 may include a cellular transceiver for mobile communications.

(10) The optional wired (attached) keyboard 267 and wireless (e.g., RF) keyboard 268 (see Figure 6a) may be used with the viewer 266 to provide communications between the subscriber and the viewer 266.

10 (11) The speaker and microphone 608' allow the viewer 266 to provide audio signals to the subscriber, and allow the subscriber to provide an audio input. The speaker and microphone 608' may be used in conjunction with the cellular transceiver 608 or other telecommunications equipment to provide for reception and transmission of telephony and data.

The viewer 266 of Figure 11 has parts available for providing connections to: a library 744, electronic card memory 748, CD ROM units 752, and a portable memory unit 756 (such as that shown in Figure 6b 600'). Various electronic memory cards such as PCMCIA can be
15 used with this viewer 266.

Security, low power consumption and excellent display technology are desired features of the viewer 266 design. The viewer 266 should be lightweight and portable. The viewer 266 contains a software operating system that allows electronic books to be stored, read and
20 erased and includes the capability to order electronic books and retain them in memory 728 for a predefined period of time determined by the system operator. The software can be configured to allow the electronic book to be read during a period of time (i.e., two weeks) and then automatically erased, read once and erased, or held in memory permanently. Each viewer 266 has a unique key 605. All of the data storage is encrypted with the key 605 for an
25 individual viewer 266 to prevent more than one viewer 266 accessing the text file or electronic book file.

Figure 12 is a flow diagram of some of the processes executed by the viewer 266. Generally, the viewer 266 receives inputs from the subscriber through touch panel controls 740. Alternately, the viewer 266 receives inputs from a touchscreen display, the attached keyboard 267, or the remote keyboard 268. The subscriber's information requests are then processed
5 800 by the viewer 266.

If the subscriber requests a menu of available electronic books, process block 804 will select a book menu. Process block 808 will open the electronic files which list the electronic books that are available (related to the category of topic of the menu) and display the menu with the names of the available electronic books.

10 If the subscriber selects a particular electronic book to read, then process block 812 will process the selection and determine the electronic file that contains the specific electronic book. Process block 816 will open the file for that specific book and normally access the first page. (If a pointer has already been set in that electronic book's file, the process may default to that page.) Process block 820 will then determine which page needs to be displayed.
15 Process block 820 will determine whether a next page, previous page or a book marked page needs to be displayed. If the pointer for the electronic file is not in the correct location then process block 828 will move the pointer and obtain the previous page of data from the stored file. Otherwise, process block 824 will normally obtain the next page of text from the stored electronic file. Process block 832 will decrypt and decompress the text data and send the data
20 to the video display. The video display will generally have a video display memory associated with it and process block 832 will send the data directly to that video display memory. The circuitry for the display then completes the process of displaying the page of text.

If the subscriber, through the controls 740, requests (from process block 800) that the power be turned off, then the process, 836, of turning the power off will be initiated. Process
25 block 840 saves the pointer in memory to the page number in the book that the viewer 266 is currently reading. Process block 844 closes all the electronic files and signals the power circuitry to shut down the power to the various circuits in the viewer 266. The subscriber may

also use the controls 740 to access other electronic files using electronic links embedded in a particular electronic file. An electronic link system will be described later in detail.

With these examples of basic processes the viewer 266 is able to display book selections and display text from those books.

5 d. Menu System

Referring generally to Figure 13, the delivery system 200 may have a menu system 851 for selecting features and electronic books from the delivery system 200. The operating software and memory required for the menu system 851 may be located at the viewer 266 (e.g., the instruction memory 732 and/or book memory 728). However, it may also be located
10 at the library unit 262 (e.g., the instruction memory 632) or the library unit 262 and the viewer 266 can share the software and memory needed to operate the menu system 851. Since the menus are usually displayed on the viewer 266 and it is preferred that the viewer 266 be capable of operating in the absence of the library unit 262, the basic software and memory to create the menus is more conveniently located at the viewer 266.

15 The menu system 851 allows sequencing between menus and provides menu graphics for graphical displays such as on the LCD display 602 of the viewer 266. In a system which uses a set top converter these menus may also be displayed on a television screen. In the simplest embodiment, the menus provide basic text information from which the subscriber makes choices. In more sophisticated embodiments, the menus provide visual displays with
20 graphics and icons to assist the subscriber.

Figure 13 depicts a menu system 851 with sequencing. The primary menus in the system are an introductory menu 850, a main menu 854 and various submenus 858. In the embodiment shown, there are three levels of submenus 858. In certain instances one or two submenus 858 is sufficient to easily direct the subscriber to the selection or information
25 requested. However, there are features in which three or more submenus 858 make the user interface more friendly for the subscriber. Each level of submenus 858 may consist of multiple possible menus for display. The particular menu displayed depends on the selection by the

subscriber on the previous shown menu. An example of this tree sequence of one to many menus are the help submenus 887, 888. Depending upon the specific help requested, a different level two help menu is displayed to the subscriber.

5 An example of an introductory menu 850 is shown on Figure 14a. Generally the introductory menu 850 introduces the viewer 266 to the system and provides initial guidance, announcements and instruction. The introductory menu 850 is followed by a main menu 854, an example of which is shown in Figure 14b. The main menu provides the viewer 266 with the basic selection or features available in the system. Figure 14b is an example of a main menu 854 offering many additional features, including interactive features, and submenus 858 to the
10 subscriber. For example, Figure 14b shows that the viewer 266 is able to choose by a point and click method, many options including: (1) free previews, (2) books you can order, (3) books in your library, (4) your current book, (5) help, (6) on-line services and (6) other system features. Following a selection on the main menu 854, a corresponding submenu 858 is shown.

Figure 13 shows fourteen available primary or first level submenus. They are (1)
15 account set up 862, (2) free previews 866, (3) book suggestion entries 855, (4) books in your library 872, (5) books you can order 878, (6) your current book 884, (7) help 887, (8) available features 890, (9) messages 893, (10) account information 896, (11) outgoing message submenu 898, (12) show links 970, (13) create links 980, and (14) show interactive files 990. Figure 14c is an example of a first level submenu for electronic books in your library
20 872. This "Book In Your Library" example submenu 872 shows six available electronic books by title and author and provides the subscriber with the ability to check a different shelf of books 874 or return to the main menu 854. Figures 14d and 14e show example submenus 858 for electronic books that may be ordered using the "Books You Can Order" submenu 878.

25 Figure 14f is an example of an order selection and confirmation menu 880', which provides a "soft keyboard" 975 for the subscriber to use in placing an electronic book order and which confirms the subscriber's order. In this particular example, the subscriber is

required to enter a PIN number to complete the subscriber's order. The "soft keyboard" 975 could be configured as a full alpha-numeric keyboard, and may be used by the subscriber to add additional information related to a book order. An alpha-numeric or similar password may be used to ensure the subscriber is an authorized subscriber. In an embodiment, the subscriber confirms an order with a PIN or password and then receives a final confirmation screen. The final confirmation screen is primarily text and may state:

Your book order is now being processed via CABLE.

Your book will be delivered overnight and your VISA account will be charged \$2.95.

Your book will be available for reading at 6:00AM EST tomorrow. Make sure that:

1. your Library Unit and Cable Connection Unit are plugged in with aerials up tonight; and
2. you tune your cable converter to THE BOOK Channel. The TV set does not have to remain on.

or similar language.

Examples of the "Account Set Up Menu" 862 and further submenus 858 related to account set up (which provide instructions and account input 864) are shown in Figures 14g and Figure 14h. These submenus 858 allow initialization of an account at the operations center 250 and orders to be charged to credit cards. The submenus 858 include the ability to enter data related to your desired PIN number or password, credit cards, phone numbers, etc. It is preferred that the account set up be performed using the telephone system. A confirmation menu verifies that the account has been properly set up with the desired PIN or password and credit card.

Free previews for books 866 are also provided by submenus (868, 870). Examples of the free preview menus are shown in Figure 14i and Figure 14j. Figure 14i shows a menu depicting various electronic books for which previews are available for viewing. Following an electronic book selection, a screen submenu showing an excerpt of the selected electronic book cover's description is provided along with an excerpt from a critic's review of the

selected electronic book. In the preferred embodiment, this preview screen for a particular electronic book also allows the subscriber to select a submenu which provides information about the author. The book preview submenu may also include a still video picture or graphics portraying a book cover or a scene from the electronic book. An example of such a still video picture or graphics is shown in Figure 14j which depicts a preview screen 870 about the author. The video may also be provided according to MPEG standards as a short moving video clip. Such a clip could be an interview with the author, for example. The author's preview screen 870 shows a picture of the author, provides a short biography, and may allow the subscriber to order the author's books. The price for ordering the authors various electronic books may also be shown on the menu. Alternatively, the previews may be provided through an electronic link system, which will be described in detail later.

In addition to free previews, in more sophisticated embodiments, the delivery system 200 provides the subscriber with an electronic book suggestion feature (see 855). This is accomplished using the menu system 851 and the processor with associated memory located at the viewer 266, library unit 262 or at the distribution point (1020 or 250). When necessary, information for the program suggestion feature is sent in the text data of the composite video signal or other transmission medium, including the PSTN, to the home system 258. With this feature, books or authors are suggested to a subscriber based upon historical data of the subscriber's previous orders, demographics or mood of the subscriber, other indicators, and/or by text word searches.

In a book suggestion embodiment, text word searches of preview information (such as book cover descriptions, critics reviews and biographies about the author) and/or text of books or other titles are performed by the library unit 262 using databases stored in the library memory 600. Personalized book or author suggestions are made to the subscriber by obtaining information from the subscriber indicative of general subscriber interests. Subscriber entries are solicited from the subscriber preferably using the electronic book suggestion entries

submenu 855. The system uses these subscriber entries either directly or indirectly to search for books or authors to suggest to the subscriber.

Generally, the book suggestion methods may be categorized into two categories, either responsive methods (which respond to a series of subscriber menu entries), or intelligent
5 methods (which analyze data to suggest an electronic book). Using a responsive or intelligent method, the delivery system 200 determines a list of suggested titles or authors and creates a second or third level submenu 856, 857 to suggest the titles for subscriber selection.

Responsive methods of suggesting titles include, for example, the use of mood questions, searching for authors, and keyword searching. Using the instruction memory 732
10 and menu generation hardware (e.g., 607) of the viewer 266, a series of mood questions can be presented on menus to determine a subscribers interest at a particular time. For this methodology, the operations center's 250 processor 404 and instruction memory 416 assign each title mood indicators (and subindicators) from a group such as light, serious, violent, short,
15 long, dull, exciting, complex, easy-read, young theme, old theme, adventure, romance, drama, fiction, science-fiction, etc. These indicators are sent to the home system 258 with the text data and are stored in library memory 600. Based upon the subscriber entries, the processor 404 associates a set of indicators with the subscriber's request and a set of electronic books with matching indicators are located for suggesting to the subscriber.

Responsive searches for authors or keywords (a search word provided by the
20 subscriber) are generally performed by the library processor 628 and instruction memory 632 on data stored in the library memory 600. For example, a keyword given by the subscriber may be searched for a match in library memory 600 storing the book reviews, critics and previews databases. Thus, if a subscriber provided an entry of the word "submarine" on an appropriate submenu, the title "Hunt For Red October" may be located by the library
25 processor 628 using instruction from a routine in the instruction memory 632.

Intelligent methods of suggesting programs include analyzing personal profile data on the subscriber and/or historical data about the subscriber such as past books ordered by the

subscriber (or buy data). This method is preferred in a book on demand system and can be performed at the distribution point or operations center 250 by the on-site processor 404 using subscriber databases stored in memory 428. The home system 258 receives the text data including program suggestion information from the distribution point or operations center 250 and generates the program suggestion submenus 855, 856, 857 using the same text data receiving 212 and viewer menu generation hardware (e.g., 607, 621) described above. Software routines and algorithms stored in instruction memories (e.g. 632, 732) are used to analyze historical data and book ordered data to determine a line of books to suggest to the subscriber.

10 The algorithms for this powerful feature of suggesting books or authors to subscribers are disclosed in detail in U.S. Patent No. 5,559,549, entitled **TERMINAL FOR SUGGESTING PROGRAMS OFFERED ON A TELEVISION PROGRAM DELIVERY SYSTEM**, issued September 24, 1996.

15 Referring to Figure 13, submenus 858 are shown on the "Books In Your Library" submenu 872 and are preferably broken into shelf numbers with submenus for each shelf 874, 876. The submenus 858 for the "Books You Can Order" submenu 878 is similarly broken out into submenus by shelves 880, 882. These shelves may each be a category or genre of books. Electronic books may be grouped into categories such as best sellers, novels, fiction, romance, etc. See Figure 14d.

20 Referring to Figure 13, the submenu 858 for "Your Current Book" 884 allows a subscriber to select a current book 884 and then determine what page to view. This selection is confirmed with a level two submenu 885. The help submenu 887 provides the subscriber with additional help screens 888. The submenus 858 for available features 890 are preferably broken out into a sequence of separate submenus for each feature 891, 892.

25 Referring to Figure 13, messages can also be sent with the delivery system 200. A level one message screen provides the subscriber with the ability to select from various

messages the subscriber has pending 893. Each message is then shown on a separate submenu screen 894, 895. The message may contain text and graphics.

Referring to Figure 13, account information is shown on a level one submenu 896 and then follow-on submenus 858 show the recent orders and your account balance 897. There
5 is also a level one submenu for outgoing messages 898 which has a follow-on submenu used as an input screen 899.

In addition to the specific features and submenus described in Figure 13 and Figures 14a through Figure 14k, many other variations and features are possible. When a book is finally selected for viewing the title page 886 will appear on the screen followed by a page of
10 text.

III. The Billing And Collection System

The billing and collection system 278 (shown in Figures 2 and 3) utilizes the latest technology in electronic transaction and telephone switching to track orders, authorize deliveries, bill consumers, and credit publishers automatically. The telephone calls initiated by
15 the phone connector 270 are received by the billing and collection system 278 which responds immediately without human intervention by placing the order and charging the consumers credit card account. Data is compiled periodically and publishers 282 are credited for sales of their books or other text. The billing and collection system 278 may also connect with subscribers through two-way cable connections, cellular, or other communication means.

20 It is preferred that the billing and collection system 278 communicate with the operations center 250 to track changes in available books and to provide statistical data to the operations center 250.

IV. Public Library, School, and Bookstore System

The electronic book system can be modified to be used at public libraries, schools and
25 bookstores. Figures 15a and 15b show arrangements of components that may be used at public libraries, schools and bookstores. Figure 15a shows one possible arrangement of components for a public library location. The main unit at the public library is the file server

900. The file server 900 is a large electronic memory unit that can store thousands of electronic books. Various electronic storage means may be used in the file servers, such as hard disks, read-write CD ROMs and read-only CD ROMs.

The system comprises five components; the file server 900, a converter or video
5 connector 904, a controller 908, a viewer 912, and a catalog printer 916. Also shown in
Figure 15a is a connection to the Internet 279 and the intranet 281. The software for
controlling the system is primarily located in the controller 908. The converter or video
connector 904 is similar to those described above. In this configuration the controller unit 908
monitors the data being transferred to the file server 900 by the converter 904. The controller
10 908 is preferably provided with a viewing screen and several control buttons. When it is
necessary to have a larger screen to perform more sophisticated controlling of the system a
viewer 266 may be connected to the controller 908 and the viewer screen and controls 740
may be used.

The controller 908 is only able to download books to public viewers 912 which are
15 authorized to receive books from the particular file server 900. For security reasons it is not
desirable that the public viewer 912 have access to more than one file server 900. In this way,
security can be maintained over the text data for books. It is preferred that the public viewer
912 be limited to receiving one or two electronic books at a time from the controller 908.
When the subscriber of the public viewer 912 needs a new or additional electronic book, the
20 subscriber returns the viewer 912 to the school or public library where the subscriber receives
a new electronic book from the controller 908.

In order to track the electronic books that are available on the file server 900, the titles
of the available books may be printed on a catalog printer 916. The catalog printer 916 is
connected to the library controller 908 and the titles of the electronic books are downloaded
25 to the catalog printer 916. None of the coded text for any of the electronic books can be
printed using the controller 908 and catalog printer 916 of this system. In order to maintain
security over the data, none of the electronic book data is allowed to be downloaded to the

printer 916. Once a complete printout of available electronic book titles, magazines, or other textual material is complete, a hard copy of the catalog 920 can be maintained at the file server 900.

5 The Internet 279 may also be used to download content to the server 900. The intranet 281 may be established between local libraries in a jurisdiction. For example, all public libraries in a count may be joined by the intranet 281. Using the intranet 281, the local public libraries may share electronic books and other data.

10 The system shown in Figure 15a may also be used at bookstores. The bookstores can rent the public viewer 912 to customers with the text for one or two electronic books loaded onto the public viewer 912. The public viewer 912 may be provided with an automatic timeout sequence. The timeout sequence would erase the textual data for the books after a certain period of time, for example, two weeks. It is expected that after a period of time (perhaps within two weeks) the renter would return the public viewer 912 to the bookstore and receive additional electronic books for viewing. Using this arrangement, it is also possible for the bookstore to (permanently) sell a viewer 912 to a regular customer. The customer then returns to the bookstore from time to time to receive textual data for an electronic book which the customer can then store permanently on the customer's own viewer 912. Various other configurations are possible for bookstores, schools and public libraries using the file server 900 and public viewer 912 described.

20 A school library, such as a university library, may use an arrangement of components such as shown in Figure 15b. Many of the components are the same between Figures 15a and 15b. In Figure 15b, software for controlling the system is primarily located in the controller 908'. The converter or video connector 904' is similar to those described above. In this configuration the controller unit 908' monitors the data being transferred to the file server 900 by the converter 904 and the Internet 279. The controller 908' is preferably provided with a viewing screen and several control buttons.

25

The controller 908' downloads "copies" of electronic books to the viewers 266 that are authorized to receive books from the file server 900. The viewers may be provided to all students at the university as part of their required equipment. In the context of the university library, the viewers may be brought to the library to receive electronic books from the server 900'. Alternately, the university may distribute electronic books through a university intranet such as the intranet 281. Software operating on the server 900 may keep track of electronic books loaned to individual students. The students may be required to "return" the electronic books after a set time, or at the end of a semester, for example.

In order to track the electronic books that are available on the file server 900', the titles of the available books may be printed on a catalog printer 916'. The catalog printer 916' is connected to the library controller 908' and the titles of the electronic books are downloaded to the catalog printer 916'.

The intranet 281 may also be establish connection between university libraries that are members of an inter-library loan program. In this way, electronic books that are resident at one university library may be sent to another university library for eventual loan to a student. In an alternative arrangement, the Internet may be used for inter-library loan programs.

V. Use of a Set Top Converter

Existing set top converters such as those made by Scientific Atlanta or General Instruments are presently unequipped to handle the delivery system 200 of the present invention. Although set top converters may be built which include the library functions, hardware modifications are necessary in order to use the delivery system 200 with existing set top converter technology.

Figures 16a and 16b are examples of hardware modifications or upgrades. A port is used to attach hardware upgrades described below to a set top terminal. Two upgrades are possible to set top converters 601 to assist in receiving and selecting electronic books. A menu generation card upgrade (Figure 16a) and an information download unit (Figure 16b). Each of these upgrades may be connected to the set top terminal unit through an upgrade port. A

four wire cable, ribbon cable or the like may be used to connect the upgrade to the set top converter 601.

A card addition 950 to a set top converter 601 is depicted in Figure 16a. The card 950 shown provides the additional functionality needed to utilize the book selection system with
5 existing set top converter 601 technology. The card 950 may be configured to slip inside the frame of a set top terminal and become part of the set top terminal, an advanced set top terminal. The primary functions the card 950 adds to the set top converter 601 are the interpreting of data signals, generating of menus, sequencing of menus, and, ultimately, the ability of the subscriber to select an electronic book using either the television or a viewer 266.
10 The card 950 also provides a method for a remote location, such as the cable headend, to receive information on electronic books ordered. The electronic books ordered information and control commands may be passed from the cable headend to the card 950 using telephone lines.

The primary components of the card 950 are a PC chip CPU 952, a VGA graphic
15 controller 954, a video combiner 956, logic circuitry 958, NTSC encoder 960, a receiver 962, demodulator (not shown), and a dialer 611'. The card 950 operates by receiving the data text signal from the cable headend through the coaxial cable. The logic circuitry 958 of the card 950 receives data 964, infrared commands 966, and synchronization signals (not shown) from the set top converter 601. Menu selections made by the viewer 266 on the remote control are
20 received by the set top converter's 601 IR equipment and passed through to the card 950. The card 950 interprets the IR signal and determines the electronic book (or menu) the subscriber has selected. The card 950 modifies the IR command to send the information to the set top converter 601. The modified IR command contains the channel information needed by the set top converter 601. Using the phone line 968 and dialer 611', the card 950 is able
25 to transmit electronic books ordered information to the cable headend. It is also possible to receive the electronic books over the telephone lines and by-pass the video distribution system.

In this embodiment, the telephone system may be used to provide access to an Internet web site to order and receive electronic books.

These commands are passed through the interface linking the set top terminal's microprocessor with the microprocessor of the hardware upgrades. In this way, subscriber
5 inputs, entered through the set top terminal keypad or remote control, can be transferred to any of the hardware upgrades for processing and responses generated therein can then be sent back to the set top terminal for display. In the preferred embodiment the IR commands 966 are transferred from set top terminal 601 to hardware upgrade.

Hardware upgrades may include a microprocessor, interactive software, processing
10 circuitry, bubble memory, and a long-term memory device. In addition to these basic components, the hardware upgrade may make use of an additional telephone modem or CD-ROM device.

The information download hardware upgrade 1001 (shown in Figure 16b) allows the subscriber to download large volumes of information from the operations center 250 or cable
15 headend using the set top converter 601. The hardware upgrade 1001 will enable subscribers to download data, such as electronic books and magazines, to local storage. Primarily, the hardware upgrade 1001 is an additional local storage unit 1003 (e.g., hard disk, floppy, optical disk or magnetic cartridge and may include a microprocessor 1005, instruction memory 1007, and a random access memory 1009, as shown in Figure 16b). Preferably, a small portable
20 viewer 266 is also provided with the upgrade 1001 to enable downloaded text to be read without the use of a TV.

The downloadable information may be text or graphics supplied by the operations center 250 or cable headend. With this upgrade, electronic books may be downloaded and read anywhere with the portable viewer 266. Using this upgrade, books may be downloaded
25 and stored in compressed form for later decompression. The electronic books would be decompressed only at the time of viewing. Important text that the public desires immediate access may made available through this system. Text such as the President's speech, a new

law, or a recent abortion decision rendered by the Supreme Court may be made immediately available.

In the preferred embodiment, electronic book ordering information is stored at each set top terminal until it is polled by the cable headend using a polling request message format.

5 An example of a polling request message format consists of six fields, namely: (1) a leading flag at the beginning of the message, (2) an address field, (3) a subscriber region designation, (4) a set top terminal identifier that includes a polling command/response (or P/F) bit, (5) an information field, and (6) a trailing flag at the end of the message. A similar response frame format for information communicated by the set top terminal to the cable headend in response
10 to the polling request may be used.

Figure 17 shows a preferred set top converter that includes a data receiver 617' and a data transmitter 1011. The data transmitter provides upstream data communications capability between the set top converter 601 and the cable headend. Upstream data transmissions are accomplished using the polling system described and, using a data transmitter
15 1011. Both receiver 617' and transmitter 1011 may be built into the set top converter 601 itself or added through an upgrade module. Regardless of the specific hardware configuration, the set top terminal's data transmission capabilities may be accomplished using the hardware shown in Figure 17.

Figure 17 shows RF signals, depicted as being received by a data receiver 617' and
20 tuner 613 working in unison. Both of these devices are interfaced with the microprocessor 1013, which receives inputs 1015, from the subscriber, either through a set top converter's keypad, a remote control unit or the viewer 266. All cable signals intended for reception on the subscriber's TV are accessed by the tuner 613 and subsequently processed by the processing circuitry 1017. This processing circuitry 1017 typically includes additional
25 components (not shown) for descrambling, demodulation, volume control and remodulation on a Channel 3 or 4 TV carrier.

Data targeted to individual set top converters is received by the data receiver 617' according to each set top converter's specific address or ID. In this way, each addressable set top converter only receives its own data. The data receiver 617' may receive set top converter 601 specific data in the information field of the signal frame described or on a separate data carrier located at a convenient frequency in the incoming spectrum.

The received data includes information regarding electronic books and menus available for selection. The subscriber may enter a series of commands 1015 using a keypad or remote control in order to choose an electronic book or menu. Upon receipt of such commands, the microprocessor 1013 instructs the tuner to tune to the proper frequency of the channel carrying data and subsequently instructs the processing circuitry 1017 to begin descrambling of this data.

Upon selection of the electronic book, the microprocessor 1013 stores any selection information in local memory (not shown) for later data transmission back to the cable headend. The microprocessor 1013 coordinates all CATV signal reception and also interacts with various upstream data transmission components. Typically, the data transmitter 1011 operates in the return frequency band between 5 and 30 MHZ. In an alternative embodiment, the frequency band of 10 to 15 MHZ may be used. Regardless, however, of the frequency band used, the data transmitter 1011 sends information to the cable headend in the information field of the response frame described. Those skilled in the art will recognize that a number of variations and combinations of the above-described set top terminal hardware components may be used to accomplish upstream data transmissions.

In the preceding described the use of a set top terminal with the electronic book system. All the functionality of the set top terminal may also be incorporated into a card that is a component of a television.

VI. Books-On-Demand System

The electronic book system 200 described may also be configured in a book-on-demand style. Figure 18a shows one example of a configuration for a books-on-demand system. A books-on-demand system requires more powerful two-way communications

between the consumer's home, bookstore, school or public library and either the operations center 250 or a distribution site 1020 such as the cable headend. This type of two-way communication can be provided by the hardware shown in Figure 17 and described above.

Referring to Figure 18a, in a books-on-demand system, the subscriber selects the
5 electronic book to be download from an available menu of electronic books (see for example Figures 14d and 14e). The data for menus of available books is usually sent to the subscriber location by the distribution site 1020. After the subscriber's menu selection, information about the subscriber selection (or request) is then communicated to either a distribution point 1020 (such as a cable headend or an Internet web site) or the operations center 250. Upon receipt
10 of this request, the needed textual and graphical information for the book is spooled and sent to the subscriber. In this manner, books are only sent when requested by the subscriber and are sent immediately upon demand for the book (or text).

In order to support such a books-on-demand system, the text delivery and distribution must be conducted on a strong nodal architected distribution system, such as, a video-on-
15 demand cable or telephone television system, an Internet web site, or through use of individual telephone access on the public telephone system.

The books-on-demand system allows for a greater selection of electronic books to the subscriber and limits the amount of communicated book data that is unnecessary or unneeded. It also provides the electronic book to the subscriber in a much timelier fashion.

20 In addition to a stronger distribution system, a books-on-demand system requires a distribution point 1020 to have more sophisticated equipment to access and "spool out" the textual information. This can be accomplished using file server technology 1024 for storing the electronic books and ATM 1028 or telephone-type switching (not shown) to distribute the textual information. The file server 1024 and distribution technology that can be used in
25 configuring such a books-on-demand system is described in U.S. Patent No. 5,262,875 and U.S. Patent No. 5,218,695, cited above.

Figure 18a shows an embodiment for a books-on-demand system that utilizes file server technology. In addition to electronic books, the embodiment of Figure 18a will support distribution of nearly any digital data. Electronic books or textual files are received from publishers 282 and other sources through local feeds 1032, ATM 1028, or by satellite dish 1036. The data is then stored in memory 1040 at the file server 1024. The distribution point 1020 may be a cable headend that receives requests from subscribers and delivers text to subscribers over a two-way communication system (such as a video-on-demand system (VOD) 1044). Alternately, an Internet web site may serve as the distribution point 1020.

The library unit 262 can be connected to either a basic premium-type service cable system 1048, a near video-on-demand type cable system (or pay-per-view (PPV) 1052) or a video-on-demand cable system 1044. In connecting with either of these three systems the library unit 262 may access the cable directly or may access the system through a set top terminal 601', 601", or 601'''.

Using the two-way video-on-demand system 1044, a subscriber is able to request a specific electronic book title and receive that text immediately following its request. To accomplish this, the distribution point 1020 transmits a list of available electronic books through the cable delivery system to the library unit 262. The library unit 262 displays the list of available electronic books on a menu or similar format. As described earlier, it is preferred that the library unit 262 use menus which list categories of available electronic books to form its request from the distribution point 1020. After selecting an electronic book, the library unit 262 sends a request signal on the two-way communication system 1044 back to the distribution point 1020. This request signal can be handled in two ways. The library unit 262 either initiates the request or the distribution point 1020 polls the various libraries on to the two-way system 1044. Upon receiving the request for the electronic book title, the text associated with that book title is transmitted to the library unit 262 using the two-way cable system 1044.

Figure 18b is an expanded view of a preferred operations center 250 that supports a regional or national books-on-demand system. In fact, the operations center 250 shown

supports distribution of nearly any digital data. The operations center 250 supports multiple feeds to receive digital information by tape 1060, 1060', ATM 1028, or satellite 1036. The information is processed through an input MUX 1064 and a small file server 1068 before reaching the master file server 1072. Digital data such as electronic books received from publishers 282 is then stored on the master file server 1072. It is preferred that the digital data is stored compressed in a standard format such as MPEG2.

A system controller 1076 provides control over the regional or national books-on-demand system. Electronic books may be packaged into groups to provide feeds to various cable headends. In addition, scheduling and marketing research are conducted at the operations center 250. In order to handle the scheduling and market research, electronic book buy data is received at the operations center 250 through a multiplexer 1082. Electronic book buy information can be provided by the operation center 250 to the billing and collection system 278.

The operations center 250 is also equipped to insert messages or advertisements into the file server. These messages or advertisements will eventually be received by the subscribers.

The master file server 1072 uses an output multiplexer 1080 and ATM 1028 as well as satellite connections to distribute digital data. In the preferred embodiment, cable headends receive text data on electronic books from the master file server 1080 through the output multiplexer 1028 and an ATM system 1028. After receiving the electronic book data, the cable headends store the books in a local file server 1024. Figure 18a's distribution point 1020 is an example of a cable headend which may receive data from the operations center 250 of Figure 18b through an ATM hookup 1088 or satellite hookup.

VII. Electronic Book Link System

Electronic book links allow the subscriber to use the electronic book viewer 266, or similar device, to traverse pre-defined paths between content in their currently viewed electronic book to related information contained either elsewhere in the electronic book,

elsewhere on the viewer 266, or external to the viewer 266, including in the library unit 262 or in a connected Internet web site. These links provide an organized and methodical method for the subscriber to quickly access related topic areas or seek clarification of the currently viewed material.

5 In an embodiment, an electronic book includes first locations, or components, such as words, phrases, sentences, sections of text, paragraphs, pages, chapters, figures, drawings, maps, video clips, and audio clips. Links to second and subsequent locations, or components, contained in the same electronic document or in another related electronic document, file, or database can be associated with each of these first components. First components with
10 underlying links can be highlighted and displayed on the viewer display 602 or on the connected television 259 or a personal computer 261 (see Figure 2). First components that have underlying links associated with them may be identified by assigning them a unique identifier. The unique identifier can be a word or phrase, an alpha-numeric value, a coordinate point, or other unique identifier. In an embodiment, each such first location may be assigned an
15 identifying index value.

 The use of the index value allows the first components to maintain links with other components, even if the electronic book is altered. For example, a subscriber may use a cut and paste edit feature to move a block of text containing a first component. Cutting and pasting will not affect the status of the first component and its links to other components. Similarly,
20 changing font style or font size will not affect the status of the links.

 In the creation of an electronic book, or subsequently, the electronic book may undergo a process that maps identifying index values to each of the first components. These index values can then be accessed by software directives that drive the presentation of alternative or linked material (e.g., material at one of the second locations) once a selection is
25 made. For each electronic book that has associated index values, the index values may be contained in a hidden table that maps the identifying index values of all first components with underlying links to the location of the linked material (the second location). Moreover, each

such first component may be linked to one or many linked material locations. That is, the first component may be linked to a second component, a third component and so on. An example of a hidden table is presented below.

As shown in the table, a first location “Cezanne” has an identifying index value 135.

5 “Cezanne” has three links. A link to a second location is to an art encyclopedia. A link to a

10

Identifying Index Value(s)	Component Identifier	Link Number	Linked Material Identifier	Linked Material Description	Linked Material Location (file location / file name / corresponding index value)
135	“Cezanne”	1	More on Cezanne	Reference material on Cezanne	Art-Encyclopedia.com/FrenchArtists/Index Value = 1
135	“Cezanne”	2	Pronunciation	Pronunciation of the word	Websters.com/ Websters E-Dictionary/Index Value = 56221
135	“Cezanne”	3	Audio Clip	Audio file providing condensed Cezanne’s biography	Viewer/ Current file/Index Value = 199384
133-135	“PorchScene by Cezanne”	1	Graphic File	JPEG file presenting Cezanne’s PorchScene painting	Viewer/ Current file/Index Value = 9382
5673	“reactivism”	1	Definition	Definition of the word	Websters.com/ Websters E-Dictionary/Index Value = 564
15 4948-4950	“Order <u>Little Women</u> ” menu item	1	Book Order	Order the book <u>Little Women</u>	Discovery.com/ Little Women Order/Index Value = 672
4949-4950	“ <u>Little Women</u> ”	1	Book review	Review of the book “Little Women”	LiteraryWorks.com/ Little Women/Index Value = 1
90462	“Dental diseases”	1	TOC link to Document Body	Link from Table of Contents to desired chapter	Viewer/ Current file/Index Value = 69980
20 1342	“Dental diseases”	2	Related discussion group	Access to Web discussion group on gum diseases	NoMoreCavities.com/ Index Value = 1
572	“VegieMaster”	1	Product Order	Order the product “VegieMaster”	HomePurchases.com/ KitchenProducts / Index Value = 1
14	“Chesapeake”	1	Video	Video clip of interview with J. Michener on writing of Chesapeake	Viewer/ Current file/Index Value = 38677
14	“Chesapeake”	2	Narration	Audio file – narration of Chesapeake by J. Michener	Viewer/ Current file/Index Value = 38678

third location is to an electronic dictionary that provides a pronunciation guide. A link to a fourth location is to an audio file that plays a short biography of the artist. Each of the second, third and fourth locations have their own index values.

5 Linked material location information (i.e., the location of second and subsequent components) can include source location, book name, chapter, page, line, and word as identified by their index value. The source location will provide the delivery system 200 the necessary information to contact the operations center 250, the Internet web site 279 (see Figure 2) or another electronic database and request the appropriate material for retrieval and download if it currently does not reside on the viewer 266 or the home system 258. In the case
10 that the linked material resides on the Internet web site 279 or on another electronic database, the location information in the hidden table allows the operations center 250 or home system 258 to retrieve the desired material from the Internet web site 279 or from the electronic database.

If the second component, or linked material, is located at the viewer 266, the processor
15 in the viewer 266 can cause the linked material to be displayed without any communications with an outside source. For example, if the first component is the name "Cezanne" and the linked material, or second location, is in an electronic dictionary stored in the viewer 266, the viewer 266 can display the electronic dictionary entry for "Cezanne." This linked material may be displayed full screen, in a picture-in-picture window, or as an overlay, for example. The
20 entry can also remain hidden, until a user of the viewer 266 commands the entry to be displayed.

Upon selection of a component with underlying links, the software directive determines the identifying index values associated with the selected component, searches the table for the index values of the selection made, looks up the corresponding linked location, accesses the
25 location, and displays the linked material on the viewer 266. The linked material can be displayed on the viewer 266 in place of the original source material, or simultaneously with the

original source material by displaying the linked material in a picture-in-picture window, via a split screen, or via a screen overlay.

Figure 19 shows a portion of a page of electronic text having one or more electronic links. The display 602 may include a show links button 606 and a help button 612. The show
5 links button 606 may be used to display a link menu 971 (see Figure 13 and Figure 20). That is, the viewer 266 can be commanded, via the show links button 606, to display all components that have underlying links. The components may be displayed in a highlighted mode, in a different color, in a unique font, bold or italic typeface, underlined, outlined, or in reverse background mode, for example. To make a selection of a component to view the underlying
10 linked material, the cursor 745, for example, is used to identify the desired selected item. The ball 743 is used to guide the cursor 745 across the page to the desired selected item, and the selection button is used to make the selection. Alternatively, cursor movement for screen navigation can be provided via devices such as a fingerpad, mouse, or joystick. Selection can also be made by incorporating a touch-sensitive screen into the viewer 266.

15 Figure 19 depicts the display before commanding the viewer 266 to show links. Figure 20 shows the display once the request has been made to display all underlying links. Figure 20 shows the link menu 971, a help button 612, and a multi-function button, or pull-down menu, 614. The multi-function button 614 can be used as a return button, a hide active links button, and a restore active links button, for example. Alternately, several additional buttons
20 may be provided to select these features. The multi-function button 614 may be active when the show links button 606 has been operated. In Figure 20, the components having underlying links are "PorchScene by Cezanne" and "Cezanne." The component "PorchScene by Cezanne" is shown with one link and the component "Cezanne" is shown with three links. Also shown in Figure 20 is the link menu 971 that lists the links, or components, the link
25 number and a description of the linked material. For example, the material linked to the component "PorchScene by Cezanne" is a JPEG video file showing the painting.

Once a link is selected, an on-screen return button 614 allows the subscriber to return from the linked material back to the originally viewed text. The show links button 606 (see Figure 19) can be displayed on the viewer 266 either at all times that an electronic book is open, any time an underlying link exists, or only when commanded to do so from the viewer's menu system 851. Alternately, a keyboard entry may be used to return from the linked material.

When linked material is displayed (for example, in an overlay fashion) the subscriber can command the linked material to be placed in a hidden state by operating the hide active link button 614 or by use of the menu system 851. When an active link is hidden, the restore active link button 614 is displayed. Operation of the restore active link button 614 will display the material linked by the active link.

Alternatively, the on screen "Help" menu 887 (see Figure 13) provides access to further assistance when selecting links. The Help menu 887 is accessed by operation of the on-screen help button 612. Related link options will be available for display on the viewer 266 by selecting the Help menu 887, using the cursor 745 to do so. The "Help" function allows the subscriber to select which specific links to be displayed on-screen. The links when displayed may be simply highlighted portions of text, or text in different colors. All links for the displayed page can be selected to be displayed. Alternatively, by selecting a range of content in an electronic book that may have multiple underlying links, only links associated with the components within the selected range will be presented on the viewer 266 for the subscriber to select the specific link desired. Alternatively, a fixed number of links may be selected to be displayed on the screen at a time. Alternatively, only a certain type of link may be selected to be displayed. The types of links that are available for display may be listed in a pop-up menu. The subscriber can choose from this pop-up menu which of the links to display. For example, the pop-up menu could list links for a dictionary and links to an Internet web site. The subscriber could choose to display only the dictionary links. Figure 21 depicts the menu screen 981 used to manage the subscriber's filtering of links to view.

Figure 22 is a logical representation of the components and links for the example first component "Cezzanne" shown in Figure 19. In Figure 22, the text block (page) 602' containing the first component Cezzanne 980 is shown linked to components in other electronic files or documents. A first link 981 links Cezzanne 980 to a reference material component 982, which is an encyclopedic entry related to the artist. A second link 983 links Cezzanne 980 to a dictionary entry 984 that includes a pronunciation key for the artist's name. A third link 985 links Cezzanne 980 to an audio clip 986, which provides an audio file describing the artist's life. If the subscriber chooses the audio clip 986, the audio file will immediately begin playing and will be broadcast on a speaker in the viewer 266, or the attached television or the attached personal computer, as applicable. The subscriber can stop the playback by operating the hide active link button 614.

The links described above may also function in two directions. A biography of Cezzanne could include a link to the JPEG file showing PorchScene. The JPEG file PorchScene could be one of several still videos of the artist's work. This JPEG file could be linked to an appropriate section of the Cezznne biography. Then, if the subscriber were viewing the JPEG file for PorchScene, the subscriber could display the link to the biography and, upon activating the link, have displayed that portion of the biography that discusses PorchScene. In this example, the same link is used to display either the JPEG file or text from the biography. The same hidden table can be used with the two electronic files (i.e., the biography and the JPEG file). Alternately, each electronic file may have its own hidden table. In this alternative, the same link may be referenced in each of the hidden tables.

In the discussion above, each first component is linked to one or more other components. However, the other components (i.e., the second and third components, for example) may also be linked together. In addition, other components linked to one first component may be cross-linked to other components that are linked to a second first component (identifying secondary or tertiary cross-links). For example, the JPEG file of PorchScene referred to in Figure 20 may be cross-linked to the audio file-biography shown

in Figure 20. Displaying the JPEG file will result in a cross-link being identified that links the JPEG file to the audio file.

The cross-link may be indicated by highlighting, underlining, outlining, using a bold or an italics typeface, using a different font, and using different color text. If the cross-linked material is selected, that material will then be displayed. In the example described above, the JPEG video file that shows the painting PorchScene can be cross-linked with Cezzanne and its identity would be displayed on the viewer 266. The video file could be displayed full screen or in a picture-in-picture format. The video file could also be displayed on the attached television 259 or the personal computer 261 (see Figure 2). Finally, the video file could be printed by sending the video data and a print command to a printer 262' attached to the home unit 258 or to the personal computer 261.

In the table previously shown, all the links for a number of electronic books were provided in one hidden table. In an alternate arrangement, many hidden tables may be provided. For example, each electronic book may be provided with a hidden table. In this alternative, the many hidden tables could form a relational database of linked material. As an example, several different electronic medical text books could each be provided with its own hidden table. An electronic general medical encyclopedia could also be provided with a hidden table. Terms that are listed in one of the several medical electronic text books could then be linked, in a relational fashion to the electronic medical encyclopedia. The several electronic medical text books could also be relationally linked to each other, to on-line databases and to other electronic files. For example, an electronic medical text book could be electronically linked to electronic books, databases and other electronic files maintained at a medical school's library.

The hidden table (either for many electronic books, or individually for each electronic book) may be provided by the central provider or distributor as an additional feature that is paid for separately from purchasing an electronic book. The distributor may offer many different levels of service, such as only linking material (components) stored on a viewer, only

linking material within a particular electronic book, or linking one or more electronic books to electronic files outside the home system 258 (e.g., linking an electronic book to a database maintained by the distributor at an Internet web site).

5 Downloading the most current links table for an electronic book from the operations center 250 or the Internet web site 279 refreshes the hidden links table, that is, any new links that have been generated by the operations center 250, for example, are added to the hidden links table. The current links table may be downloaded in conjunction with downloading a new electronic book. Alternately, the current links table may be provided periodically by the operations center 250.

10 Subscribers can create their own links by adding new entries to the hidden links table, using Hypertext Markup Language (HTML) or other standard programming language or by using a simple graphical user interface, for example. In an embodiment, an on-screen, software-based, menu-driven facility is provided, accessible through the menu system 851 (see Figure 13), that allows the subscriber to select the desired source components to define an
15 underlying link, to select the desired linked components and define their location, and to create the remaining table entries. Creation of table entries can be supported via either an on-screen, simulated keyboard, the attached keyboard 267, or the remote keyboard 268 (see Figure 6a). To ease creation of links, default table entry items may be offered to the subscriber by the menu system 851 where ever possible. The desired linked components can be accessed and
20 displayed simultaneously with the desired source components via the use of a picture-in-picture window, via a split screen, or via a screen overlay. Alternatively, if the material to be linked is to be created by the subscriber, the subscriber can create a new content file on the viewer 266 and link directly to components in that newly created file. This allows the subscriber to create customized annotations and notes that are directly associated with the specific
25 components of an electronic book. Text entry into the newly created file is handled via either the on-screen, simulated keyboard, the attached keyboard 267, or the remote keyboard 268.

As noted above, links within electronic books may be self-contained in nature, where all the material to be linked to is resident within the same electronic book file. Additionally, links may also be provided between material residing on the viewer 266. Also, links may be provided to material that currently resides on the home system 258, if separate from the viewer 266. Finally, links may be provided to material that must be accessed through a communications network. For example, material that is ordered or downloaded from the operations center 250 or the Internet web site 279 may be linked to the electronic book. On screen menus can also be supported on the viewer 266 in the form of electronic book files, serving as a book or product catalog or service catalog that allows the subscriber to link to the operations center 250 or the Internet web site 279 to order additional electronic books or products and services at any time by selecting the desired component from the text.

If the content that is to be linked to is currently not available on the electronic book viewer 266, the viewer 266 may prompt the subscriber to decide whether to: 1) retrieve the corresponding material immediately from the home system 258, the operations center 250, or the Internet web site 279; 2) wait until the next communication opportunity with the home system 258 or operations center 250 to retrieve the material; 3) commence direct outside communications with another communications system (e.g., a telephone in a PSTN); or 4) stop.

In one embodiment, the first components on the viewer 266 are a Table of Contents and List of Figures for a book. Making a selection from the Table of Contents and List of Figures automatically links to and displays the selected page within the electronic book file. In another embodiment, the first components on the viewer 266 may be an Index of an electronic book. Selecting the desired topic and associated page will cause that page to be displayed on the viewer 266. In yet another embodiment, the first component is a footnote or endnote. When the footnote is selected, the viewer 266 provides a display of material that further addresses the reference. In another embodiment, the first component is a word or phrase that has a further definition or clarification associated with it. By selecting the first component, the corresponding dictionary definition, foreign translation, or glossary entry will be displayed on

the viewer 266. The dictionary definition or foreign translation may also be provided via an audio file. In this embodiment, electronic books can be bundled with other standard reference material or alternatively, stand-alone reference material like dictionaries or encyclopedias may be accessed from within multiple electronic book files.

5 In another embodiment, the first component is a reference to another electronic book altogether. By selecting the first component, the selected book is displayed on the viewer 266. In another embodiment, on-screen menu buttons will be displayed on the viewer screen 602 that allow for a quick link to the Table of Contents, Index, glossary, and other key electronic book sections by simply selecting the item on the viewer screen 602 with the cursor 745. In
10 yet another embodiment, the selected first component links the subscriber to a book review or series of book reviews, providing additional information to assist in the decision of selecting a new electronic book. In another embodiment, the selected first component is a book title, chapter title, or text in the body of a book that is linked to an audio file that serves as an audio narration of the selection that is played on the viewer 266. In yet another embodiment, the
15 selected first component links to a video file (JPEG or MPEG) that can be displayed on the viewer screen 602. Another embodiment is a first component that links to textual annotations and notes that have been created by the subscriber.

 One embodiment includes first or subsequent components that are electronic book titles that, when selected, links the subscriber to the operations center 250 or the Internet web site
20 279 to allow for the ordering of the selected book. In a similar embodiment, the selected component consists of a product that, when selected, link the subscriber to the operations center 250 site or an Internet web site to allow for the ordering of the selected product. Lastly, in another embodiment, the selected component is a topic on which there is a link to an Internet-based discussion group that addresses the topic in more detail.

25 When a link is provided to link a word or phrase to a foreign language dictionary, the viewer 266 may display a foreign language selection feature. The subscriber may then indicate which language to use when activating the link. For example, an English word or phrase in the

electronic book may be linked to a French, Spanish or German dictionary. The subscriber may specify which of these foreign language dictionaries to link to.

VIII. Interactive Electronic Book

Returning to Figure 6b, a block diagram is shown of an electronic book home system 258 that may incorporate advanced features related to interactive electronic books. The home system 258 is shown including a separate library unit 262 and viewer 266. However, the functions of the viewer 266 and the library unit 262 may be included in one unit. Other peripheral devices, such as the hand-held calculator, for example, may connect to the viewer 266 and/or the library unit 262.

Figure 23 is a logical diagram of an interactive electronic book 1100 that may be stored in memory in the library unit 262 or the viewer 266. The interactive electronic book 1100 is a data file that contains the text and graphics data of a book. The data file may also include links to other electronic files, and a program for executing the interactive features. The electronic book 1100 may include one or more interactive files. The interactive file may be coupled to the data file. In the example shown in Figure 23, the interactive electronic book 1100 includes an embedded exercises module 1110, an example problems module 1120, an electronic tutor 1130, links 1140 to other files, an operating program 1150, a security program 1160 and other interactive programs 1170.

The interactive electronic book 1100 may be an electronic college textbook on probability models, for example. The example problems may be typical probability problems that in a paper book could be presented as text and graphics. However, in electronic form, the example problems may provide for interaction with the user. For example, a chapter on Markov chains could start with a simple example showing how to compute transition probabilities. In this case, the example would be displayed on the viewer screen, and a user would be prompted to work through the example. If the user made a mistake (mathematical or logical) the interactive electronic book would provide an error message, or show the user the correct step. In this way, the user will receive "guided" instruction for solving the example.

Once the simple problem is solved by the user, the interactive electronic book could move to more difficult concepts such as time reversible Markov chains, for example. Because the interactive electronic book is an electronic file, many more example problems may be presented.

5 The interactive electronic book 1100 may contain links 1140 to other electronic books or files. These other electronic books or files may contain additional problems, background material, or further explanation of the concepts presented in the interactive electronic book 1100. The links could connect the user, through the interactive electronic book 1100, to an Internet web site such as the Internet web site 279 or 279' shown in Figure 2. Such an Internet
10 web site could be for a college professor who teaches the course on probability models. Alternatively, the web site could be for a local study group, or a group that offers tutoring assistance.

 The interactive electronic book 1100 may also include the electronic tutor 1130. The electronic tutor includes programming to present textbook or similar material to a student in a
15 structured learning environment. The electronic tutor 1130 may start with a presentation of basic material. Then, as the student, or user, develops proficiency, as indicated by performance on embedded exercises, the electronic tutor may progress to more difficult material, for example. The electronic tutor 1130 could present an electronic study guide for probability models. The electronic tutor 1130 could include sample problems like those
20 described above with respect to the example problems module 1120. The electronic tutor 1130 could also let the user pose questions by, for example, entering questions using the keyboard 267 and a pointing device. The electronic tutor 1130 could guide the user through basic concepts, advancing to each new topic at a rate controlled by the user.

 The interactive electronic book 1100 includes embedded exercises 1110. The
25 embedded exercises 1110 may include homework problems 1112 and quizzes or tests 1114. Examples of the embedded exercises 1110 as used in the interactive electronic book 1100 are provided below.

To execute the interactive features of the interactive electronic book 1100, the operating program 1150 may be stored in memory, such as the memory 600 of the library unit 262. Other programs, such as an embedded exercises applications program 1155 and a security program 1160 may also be stored in the memory 600. Alternatively, one or more of the operating program 1150, the applications program 1155 and the security program 1160 may be stored in the viewer 266. Furthermore, one or more of the operating program 1150, the applications program 1155 and the security program 1160 may be provided as a stand alone product or may be provided with the interactive electronic book 1100. When provided as a standalone product, a program may be down loaded from an Internet web site, or may be provided using any distribution system that is used for down loading an electronic book. Finally, interactive applications programs 1170 other than the embedded exercises program 1155 may be provided.

A first example of an embedded exercise may be a selection of review questions that could be at the end of a chapter on asynchronous transfer mode (ATM) in a college textbook on telecommunications system engineering. A sample of the review questions might be:

1. Give the size, in octets, of the ATM cell. How much is header, and how much is payload? Why must we be careful when we specify this?
2. Describe at least two functions of the HEC in the ATM header.
3. Describe how the cell delineation algorithm works.
4. What is the purpose of meta signaling in ATM?

In this first example, the questions may be provided at the end of the ATM chapter. Alternatively, the questions may be located at a remote location and may be accessed through an electronic link to the ATM chapter. If an electronic link is employed, a textbook provider may update the questions (and answers) periodically to stress fundamental points. This may be particularly useful where a given technology is evolving. The updated questions may be tied to a periodic revision to the textbook. For example, when a student purchases the textbook, the student may also purchase an update service. The update service may be good for one year, or a number of years, for example. Alternatively, the updates may be include in the basic

price of the interactive electronic book. When the updates are available, the student may acquire the updates by accessing the textbook provider by way of an Internet web site, for example. In this example, the update provides not only revised text for the chapter on ATM, but also revised interactive review questions that stress the new material added to the ATM chapter.

The above review questions, whether provided at the end of the ATM chapter, at some other location in the interactive electronic book, or at the Internet web site, may include a text box in which the student may provide a response. The size of the text box may expand as the student provides the answer. The student may use a keyboard to type in an answer into the text box, and the size of the text box expands as the answer is provided. If the text box is provided in the interactive electronic book, expansion of the text block might cause repagination of the electronic book. However, repagination may not be desired. Accordingly, the interactive electronic book 1100 may be structured such that when an embedded exercise is activated, a separate electronic file is created and saved. The separate electronic file retains a link to the interactive electronic book, but may be saved as a separate file in the viewer 266 or the library unit 262. The creation of the separate electronic file may be automatic when the user first activates the embedded exercise, or may require a separate action on the part of the user to first create the separate file. The operating program 1150 may also provide a prompt to the user to save the separate file, and may suggest a default location and file name, for example.

As noted previously, the viewer 266 may be coupled to a full function keyboard by a wired or wireless connection. The viewer may also be coupled to other standard I/O devices such as a mouse, for example. The use of a separate keyboard may make completion of an embedded exercise easier, particularly when a lengthy response, such as a short essay answer is required. Alternatively, the user may enter a response by writing an answer on a special pad that produces an electronic version of the writing. The user may also use a voice-activated

program to dictate a response that is converted by a standard voice recognition software program into text.

The above example of an embedded exercise requires an essay response. Other embedded exercises may call for a short, one or two word answer, or may employ multiple choice questions or true/false questions. An embedded exercise using multiple choice questions may be completed easily using the cursor controls and select button of the viewer 266 or a soft keyboard.

In the above example of an embedded exercise, a professor may also create the set of review questions and post the review questions on an Internet web site. Users may then access the review questions on the Internet web site by activating a link in the interactive electronic book 1100.

The above embedded exercise may include model answers, or, alternatively, may include links to portions of the textbook that provide the material from which an answer may be prepared. For example, after the user completes a specific action, such as answering all the questions in the embedded exercise, and signifies this completion by operation of a command function, the user may then be able to activate a link to a part of the interactive electronic book 1100 that contains the model answers. Alternatively, the link may connect the user to a separate electronic file provided in the viewer 266, the library unit 262, or an Internet web site, for example.

This provision for restricting access until after the user performs the specific function may be desired in circumstances in which the answers to questions in the embedded exercises are submitted to a professor for grading, for example. That is, the user answers the questions, and then submits the answers for review/grading before the user is allowed access to the model answers.

Alternatively, the user may be denied access until the questions are answered and another function completed. This other function may be operation of an ENTER command,

using a track ball and click device or a mouse, for example. The other function may also be selection of an exercise completed icon that is displayed with the embedded exercises.

In addition to presenting model answers at the completion of the embedded exercise, the interactive electronic book 1100 may be configured to present the model answers at the completion and submission of each individual answer. Finally, the model answers may be
5 accessed without any restrictions as to completion of all or any part of the embedded exercise.

Figure 24 shows an example of the above-described embedded exercise in which the answers are submitted to a professor's Internet web site for grading. An embedded exercise 1200 includes a header block 1210, a questions block 1240, and an ending block 1260. The
10 embedded exercise 1200 includes questions at the end of a chapter on ATM from a college textbook on telecommunications system engineering. The header block 1210 includes a name block 1212 in which a user types in the user's name. The name block 1212 may include additional functionality. For example, in the case of a specific course at a university, only those names of students who are registered for the course may be accepted in the name block 1212.
15 Acceptance of a name may be indicated by an underline after the name is entered. The underline may be provided by a separate security program associated with the professor's Internet web site. As shown in Figure 24, the name "Student, Ima" is recognized by the security program, and is therefore underlined. The header block 1210 may also include a social security block 1213 for recording the user's social security account number (SSAN).

20 The header block 1210 also includes a password block 1214. The password may be provided on an exercise-by-exercise basis, or on a series of embedded exercises, or may be a password selected by the user, and may be a password given to the user at the start of the course, for example. Until the password is entered and accepted, the security program 1160 may not allow the remainder of the embedded exercise 1200 to be accessed. That is, until the
25 password is accepted, the questions may not be displayed. Alternatively, the questions may be displayed, but the user may not be allowed to provide any answers.

Next, the header block 1210 may include a date block 1216. The date block 1216 may be filled in automatically by the operating program 1150 for the interactive electronic book 1100. As noted above, the operating program 1150 may be provided with the interactive electronic book 1100. Alternatively, the operating program 1150 may be a stand alone program that is used with a number of separate interactive electronic books. As an alternative to automatic entry of the date, the user may provide the date by typing in the date, for example.

A time block 1218 is next provided. The time block 1218 may also be entered automatically by the operating program 1150 or may be entered by the user. The time block 1218 may include a provision for start and stop times. The time block 1218 may also indicate elapsed time. For a timed embedded exercise, the time block 1218 may include a digital and/or an analog display of time elapsed, or alternatively, time remaining, to complete the embedded exercise. At the end of the allotted time (or number of days), the operating program 1150 may prevent any further entries in the questions block 1240, but may still allow entries in the header block 1210 or the end block 1260. If the user finishes the embedded exercise 1200 before the allotted time, the time block 1218 may display the actual time used to complete the embedded exercise 1200.

A school block 1220 and a course block 1222 may also be provided in the header block 1210. The course block 1222 may provide the course title and a corresponding course number, for example. Alternately, the course title and course number may be provided in separate text blocks. The school block 1220 and the course block 1222 may be optional blocks that are used when one professor teaches a same course at more than one school, such as a course taught over a telecommunications network, for example. Other information blocks, such as a professor's name block (not shown) may also be provided.

The questions block 1240 is shown with four questions 1242 and four corresponding text answer blocks 1244. Any number of questions may be provided in the questions block 1240. Additional "pages" may be required to accommodate a long embedded exercise. The questions may not be provided until satisfactory completion of some or all the text blocks in the

header block 1210. Alternatively, the questions may be displayed, but access to the text blocks denied until completion of some or all of the text blocks in the header block 1210. Finally, the questions may be provided and all the answer blocks 1244 accessed at any time.

The answer blocks 1244 may be expandable to any size to allow for lengthy answers. Alternatively, the length of one or more of the answer blocks 1244 may be fixed to limit the length of one or more answers. If required by the length of the answers, the embedded exercise 1200 may add additional pages.

To ensure no loss of data, the embedded exercise 1200 and the operating program 1150 may employ an automatic back-up function that saves any entries. The back-up function may be set to occur periodically or whenever the answer block 1244 is accessed, for example. Thus, after completion of the first answer, the user may go to the second or a subsequent question 1242. By placing the cursor in the corresponding answer block 1244, the user may activate the back-up function.

The embedded exercise 1200 may require that the questions 1242 in the question block 1240 be answered in the order presented. Alternatively, the questions may be answered in any order. In addition, the embedded exercise 1200 may incorporate a function that does not allow access to a previously completed answer once a subsequent answer block 1244 is accessed.

The end block 1260 includes associated functionality for the embedded exercise 1200. For example, the end block 1260 may include a soft send button 1266 that may be used to submit the completed answers 1244 to a remote location such as the professor's Internet web site. The send button 1266 may be used to submit individual answers 1244 or all answers at one time. In addition to the professor's Internet web site, the completed answers 1244, either individually, or as a group, may be submitted to: 1) the electronic book viewer 266 and temporarily stored in the memory 600"; 2) the library unit 262 and temporarily stored in the memory 600; or 3) another remote location.

The end block 1260 may include a soft instruction button 1264 that, when selected provides a set of instructions for taking the embedded exercise 1200. The instructions may be made generic for one or more embedded exercises, or may be made specific to a particular embedded exercise such as the embedded exercise 1200. To indicate that instructions are available for the embedded exercise 1200, the instruction 1264 may be displayed bright, and to indicate an absence of instructions, the instruction button 1264 may be dimmed. When selected, the instruction may be displayed in an instructions screen that overlays the embedded exercise display. If the instructions must be read prior to starting the embedded exercise, the operating program 1150 may prevent access to the questions block 1240 until the user indicates that the instructions have been read. The user may indicate the instructions have been read by selecting an instructions read button (not shown). The user may exit the instruction screen by selecting an exit button (not shown).

Next, the end block 1260 may include a help soft button 1266 that provides general information related to completing an embedded exercise. Activation of the help button 1266 may provide access to several layers of help screens that may be displayed in an overly fashion on the viewer screen. A first help screen may provide a menu of subsequent help screens. Use of such help screens is described in U.S. Patent Application Serial No. 08/928,630 entitled SET TOP TERMINAL FOR TELEVISION DELIVERY SYSTEMS.

Other features may be incorporated into the end block 1260 such as a warning block 1268 and a honor code block 1270. The warning block 1268 could provide standard warnings such as a warning to save before ending. The warning block could also provide a visual warning that the end of an allotted time to complete an embedded exercise is close. The honor code block 1270 could present a school's honor code related to completing homework or an exam, for example. The honor code block 1270 could also provide a signature space 1272 for an electronic signature or other indication that a user must complete prior to beginning

the embedded exercise 1200, or prior to transmitting the embedded exercise 1200, for example.

The embedded exercise 1200 could also incorporate other useful features such as a connection to a hand-held calculator. Such calculators are well known in the art and may provide a direct data transfer between the calculator and the viewer 266. For example, a user may perform a graphing calculation on the hand-held calculator. The user can then transfer the graph displayed on the hand-held calculator to the memory 600 in the viewer 266. Next, the user can transfer the graphical data to the embedded exercise 1200 and the graph may be displayed as an answer to a question listed in the embedded exercise 1200. To accomplish the data transfer from the hand-held calculator to the viewer 266, the viewer 266 may include a cable connection port, for example.

The questions presented in the question block 1240 may be randomly chosen from a data base 1280 of questions. The data base 1280 may exist in memory of the viewer 266, or may be located at the professor's Internet web site, for example. The data base 1280 may be composed of multiple choice questions of varying degrees of difficulty. When the embedded exercise 1200 is first presented, a select number (e.g., 10) of questions from the simplest category of questions in the data base 1280 may be presented. The operating program 1150 or the embedded exercise application program 1155 may monitor the successful completion of the (ten) questions. Users who score over a certain limit (e.g., 8 or more out of 10) may be presented with another set of (ten) questions, but with more difficulty than the first set. For users who score less than the minimum, the next set of (ten) questions may be equal in difficulty to the first ten questions.

The question block 1240 may also include a display window 1248 that shows a model answer for an essay question. For a multiple choice question, the display window 1248 may be programmed to display the correct answer along with an explanation of why the answer is correct, and why the other possible choices incorrect. The display of model answers and other related data may be used as a further teaching technique.

Finally a statistics block 1250 may present the number of question in the question block 1240, the number of questions answered correctly, and other data related to the embedded exercise 1200. Both the statistics block 1250 and the display window 1248 may only appear when the embedded exercise 1200 provides these options. The statistics block 1250 may also provide results of other users who have previously taken the same test.

A second example of an embedded exercise may be questions on a test in a college-level course in probability theory. Such a test is shown in Figure 25, and applies to a course in probability theory. An embedded exercise 1300 is shown displayed on the viewer 266. The embedded exercise 1300 includes a header block 1310, a questions block 1340 and an end block 1360. The features in the header block 1310 and the end block 1360 are similar to the corresponding block shown in Figure 24.

The questions block 1340 includes questions 1342 and corresponding answer blocks 1344. The answer blocks 1344 may be simple text blocks that expand as text is entered into the block. The text may be entered by typing using an attached keyboard and a word processing program, for example. The text may be loaded into an answer block 1344 by copying or transferring a file from another storage medium such as a disk. Data may be loaded into an answer block 1344 by transfer from an attached peripheral device such as a graphing calculator. Text may also be entered by writing, using a stylus and an electronic writing pad, for example.

Figures 26a – 26c is a flow chart illustrating the operation of the interactive electronic book 1100 when a user completes the embedded exercise 1300 shown in Figure 25. The embedded exercise 1300 is administered as a graded quiz that is to be submitted to the Internet web site 279. The process generally proceeds from the start step S100. In the activate step S110, the operating program 1150 receives a command to activate the embedded exercise 1300. In the display embedded exercise step S120, the operating program 1150 displays the interactive embedded exercise 1300 on the viewer 266.

In the receive name and password step S130, the operating program 1150 receives a name and password for a user. In the verify name and password step S140, the operating program 1150 determines if the received name and password are satisfactory. If the received name and password are not satisfactory, the operating program 1150 moves to the warning and prompt step S150. Otherwise, the operating program 1150 moves to the display instruction prompt step S160.

In the display warning and prompt step S150, the operating program 1150 displays a visual warning that the entered name and/or password are incorrect. The operating program 1150 then returns to the receive name and password step S130. The operating program 1150 may continue to display the warning each time the name and/or password are incorrectly entered. Alternatively, the operating program 1150 may include a feature that locks out the embedded exercise 1300 after a number of incorrectly entered names and/or passwords.

In the display instruction prompt step S160, the operating program 1150 displays an embedded exercise instruction prompt in the end block 1360. The embedded exercise instruction prompt reminds the user to request that the instructions for completing the embedded exercise be displayed. In the receive display command step S163, the operating program 1150 receives a display instructions command. Next, in the display instructions step S165, the operating program 1150 displays the instruction on the viewer 266 screen. The displayed instructions may cover the entire screen or may be displayed in a window. In the receive acknowledgment step S170, the operating program 1150 receives an instruction acknowledgment, indicating that the user has reviewed the instructions.

In the display honor code prompt step S180, the operating program 1150 displays the honor code prompt in the end block 1360. Next, in the receive display command step S183, the operating program 1150 receives a command to display the honor code statement. In the display honor code step S185, the operating program 1150 displays the honor code statement. Then, in the receive acknowledgment step S190, the operating program 1150 receives an acknowledgment indicating that the user has reviewed the honor code. In the receive start

command step S200, the operating program 1150 receives a start command to begin the embedded exercise. In the provide time stamp step S210, the operating program 1150 provides a time stamp indicating the start time for the embedded exercise 1300 and starts an embedded exercise time clock indicating the remaining time (or days) available to complete the embedded exercise 1300. Then in the time expired? step S220, the operating program 1150 determines if time remains to complete the embedded exercise 1300. In step S220, if time remains to complete the embedded exercise 1300, the operating program 1150 moves to the display questions step S230. Otherwise, the operating program 1150 moves to the issue end signal step S250.

10 In the display questions step S230, the operating program 1150 displays questions in the questions block 1340. In the receive response step S240, the operating program 1150 receives answers in the answers blocks 1344. The operating program 1150 then moves to the receive end signal step S260.

15 In the issue end signal step S250, after the operating program 1150 has determined that the allotted time for the embedded exercise 1300 has expired, the operating program 1150 issues an end signal, displays an end warning in the end block 1360 and prevents further entries into the answer blocks 1344. The operating program may also display one or more warning at a time prior to an expiration of the allotted time for the embedded exercise. The operating program 1150 then moves to the end time stamp step S270.

20 In the receive end signal step S260, the operating program 1150 receives an end command indicating that the user has completed the embedded exercise 1300. The operating program 1150 then moves to the end time stamp step S270.

25 In the end time stamp step S270, the operating program 1150 provides a time stamp for the embedded exercise 1300 indicating the elapsed time to complete the embedded exercise 1300. Next, in the display send prompt step S275, the operating program 1150 issues a prompt that is displayed in the end block 1360 prompting the user to send the embedded exercise 1300 to the Internet web site 279. In the receive send command step

S280, the operating program 1150 receives a send command instructing the operating program 1150 to send the completed embedded exercise 1300 to the Internet web site 279. Then, in the save file step S290, the operating program 1150 saves the embedded exercise 1300. In the send file step S300, the operating program 1150 sends the completed embedded exercise
5 1300 to the Internet web site 279. Next, in the receive receipt acknowledgment step S310, the operating program 1150 receives an acknowledgment of receipt from the Internet web site 279. Then, in the display receipt step S320, the operating program 1150 displays the receipt acknowledged on the viewer 266. The operating program 1150 then moves to step S330 and ends.

10 The interactive electronic book 1100 may support a variety of interactive applications programs 1170 in addition to embedded exercises. For each of the interactive applications, interactions with the viewer 266 are supported through the use of a full function keyboard by a wired or wireless connection. Alternatively, the viewer 266 may be coupled to other
15 standard I/O devices such as a mouse, joystick, touch sensitive pad, touch sensitive screen or a stylus and electronic writing pad, for example. The user may also use a voice-activated program to dictate the desired material that is converted by a standard voice recognition software program to text for storage.

One embodiment of an interactive application program is a contact manager/address book. In this embodiment, the interactive electronic book 1100 supports the viewing of
20 existing entries in the book, searching for entries using the features called out in copending U.S. Patent Application Serial No. 09/237,827 entitled ELECTRONIC BOOK HAVING LIBRARY CATALOG MENU AND SEARCHING FEATURES, filed January 27, 1999, as well as the entry and storage of new entries within the contact manager/address book. In another embodiment, the interactive electronic book 1100 supports an interactive
25 dictionary function, where a word can be entered into the viewer 266 and the resultant dictionary definition is provided on the viewer 266 screen. In a similar embodiment, the interactive electronic book 1100 supports an

interactive foreign language translation function, where a word or phrase in one language can be entered into a field on the screen of the viewer 266 and the resultant foreign language translation and related pronunciation is displayed on the viewer screen. Alternatively, an embodiment may support a currency translation function, where an amount in one currency is entered into a field on the screen of the viewer 266, and the resultant currency translation for the selected end currency is displayed on the viewer screen.

In yet another embodiment, the interactive electronic book 1100 supports an interactive calendar/scheduling function. In this embodiment, the viewer 266 supports the viewing of schedules for a user-selected timeframe, as well as the entry and storage of new entries within the calendar. In another embodiment, the interactive electronic book 1100 supports the function of a survey tool, presenting survey questions on the viewer 266, and allowing for the entry of responses into fields displayed on the viewer 266. In yet another embodiment, the interactive electronic book 1100 supports the function of mobile inventory tracking and management. In this embodiment, the viewer 266 may present current information related to an inventory item and provides for the modification of this information, such as the number of physical items in stock, for example. In this embodiment, the viewer 266 may be capable of providing these modifications to a central inventory tracking system via any number of communication means supported by the viewer 266 or library unit 262. Finally, the interactive electronic book 1100 supports a fax sender function. In this embodiment, a portion of text in an electronic book may be selected for sending, or alternatively, new text may be entered into a field on the screen of the viewer 266. Once the desired content to be faxed is selected, a destination fax number is entered in the appropriate field. Upon completion, the content to be faxed may be uploaded to a central site, like a web site, via any of the supported communication means supported by the electronic book system, where the fax is then delivered by a fax server at the Web site to the desired recipient.

Electronic books may support interactivity in the sense that the next screen of content displayed is based on the input of the user, providing the user control over the flow of the

content that is presented. This has numerous potential applications. For example, the electronic book can serve as an assisted diagnosis support tool. In this example, the electronic book may present a question to a doctor concerning their patient's symptoms. Based on the response, further prompts may be provided by the electronic book to assist the doctor in

5 appropriately diagnosing a problem. Alternatively, this interactive diagnosis model may be used in troubleshooting and isolating technical problems, where the electronic book file may be provided by an equipment manufacturer to support a technician in systematically approaching the problem resolution effort. Similarly, the electronic book file may be a guided inspection that will not present the next stage of the inspection until all the steps for the current stage of

10 inspections are completed and appropriately noted on the electronic book screen by the user. This results in a regimented, audited process where relevant guidance may be presented on the viewer 266 at each step of the inspection. Finally, the interactive electronic book may serve as an educational or vocational training tool. In this example, as sections of text are presented to the user, summary questions may be provided on the viewer screen. If the user indicates

15 they experienced problems in understanding a certain topic area, additional material is presented to assist the user's comprehension of the topic. Additionally, progression to the next section of the electronic book text may also be made contingent on the successful completion of an interactive summary exercise.

In another interactive application embodiment, the user may be given the option of

20 selecting a character in a story from whose perspective the story is presented. Alternatively, users may be provided the capability to select the course and flow of an actual electronic book at certain points. In this example, the electronic book file may be a fictional story that the user has control of which ending to present, based on the user's input. Finally, the electronic book may have certain sections written differently, and the selected alternative is displayed upon

25 request. For instance, a child's version, a teenager version, and an adult version of the same story or portion of a story may be available and the appropriate text will be displayed based on the user's input when prompted.

To support the interactive electronic book embodiment above, passive electronic book text is retrieved from the database 1280 in Figure 23. When a point in the electronic book text is reached that contains interactivity, a hidden indicator of this interactivity is detected by the operating program 1150. The appropriate interactive file, as noted by the indicator, is then
5 retrieved from the interactive files 1170 storage for presentation on the electronic book viewer 266.

Figure 27 is a flow chart illustrating the operation of the interactive electronic book 1100 in this embodiment. The process starts with Step S400, with the operating program 1150 evaluating each displayed electronic book page to determine whether the inclusion of
10 interactive content exists. In step S402, the operating program 1150 detects the interactive indicator in the electronic book text file. The interactive indicator may be located within the text or in a header, such as a page header, for example. In step S404, the operating program 1150 retrieves the interactive content from the interactive files storage 1170 based on the interactive file as noted in the indicator. In step S406, the operating program 1150 formats and displays
15 the interactive file on the electronic book viewer 266. The operating program 1150 then waits for a response submission from the user in step S408. Upon submission of the user's response, in step S410, the operating program retrieves the user's response and in step S412 processes the inputs, performing the appropriate action based on the user's response. In most cases, the input will require the retrieval of additional interactive files 1170 from storage for display, as
20 presented in step S414. Upon performing the requisite processing, the operating program 1150 resumes its operation in providing non interactive electronic book content to the viewer 266 in step S416.

The embedded exercises 1200 and 1300 described above are only examples of uses for interactive electronic books. Interactive electronic books could also include self-teaching
25 foreign language textbooks, law school and medical school textbooks, and high school and grammar school text books. In addition to school-related books, interactive electronic books could be used in many other self-help and entertainment areas. For example, interactive

electronic books could be used in conjunction with college entrance examination study guides. Interactive electronic books could also be used for crossword puzzle books. Virtually any type of paper book that requires a user input, or presents examples for a reader to learn by, may be adapted to an interactive electronic book.

5 In addition to the audio visual features presented in an interactive electronic book, the interactive electronic book may include audio features. For example, an interactive electronic book may be used to help a user learn to speak a foreign language by using an audio output of the correct pronunciation of foreign words.

10 In addition to specific interactive electronic books, the viewer 266 may contain other electronic files that provide interactive functions for a user. As described previously, an interactive electronic book may be used for an electronic book purchasing system and an electronic book suggestion feature. Other interactive files may be used to reserve and purchase airplane tickets and to order products and services electronically. Finally, the viewer 266 may store interactive files that allow one user to communicate with a second user. This
15 communication can be used to send and receive messages and to play games, for example.

 To make use of the interactive electronic books and interactive files easier, the menu system 858 may include a show interactive files sub-menu 990 and an interactive file sub-menu 991. The show interactive files sub-menu 990 may list the interactive electronic books and other interactive files that include interactive features. Figure 14k shows a page of the
20 interactive file sub-menu 991. In figure 14k, the interactive files and interactive electronic books are shown in alphabetical order. Beneath each title is a list of the interactive files that may be accessed from the viewer 266. To access a particular interactive file (or embedded exercise) the cursor and select buttons are operating to select a desired file. Operation of the select button may establish an electronic link to the desired file, which then may be displayed
25 on the viewer. If a particular interactive file is not accessible, its title may be displayed dimmed. Interactive files that are password protected may be so indicated. Interactive files that require

a connection to a source outside the viewer 266 may also be indicated when the interactive file is highlighted. The indication may be provided in a pop-up window 992, for example.

To ensure the interactive file sub-menu 991 and the show interactive files sub-menus 990 are kept current, the viewer 266 may extract data from interactive electronic books and other interactive files as they are loaded into the viewer 266. The extracted data is then used to update the sub-menus 990 and 991. When interactive electronic books and other interactive files are removed from the viewer 266, the viewer 266 deletes corresponding entries from the sub-menus 990 and 991.

While this invention has been described in conjunction with the specific embodiment outlined above, it is evident that many alterations, modifications and variations will be apparent to those skilled in the art. Accordingly, the preferred embodiments of the invention as set forth above are intended to be illustrative, not limiting.

In the Claims:

1. An electronic book viewer having a display for displaying an interactive electronic book and an associated interactive file, the viewer comprising:

a data storage device having stored thereon the interactive electronic book, the interactive electronic book comprising:

text and graphical data,

an electronic link coupled to the text and graphical data and to the interactive file, wherein the interactive file is located in a file remote from the interactive electronic book; and

a control program coupled to the electronic link, wherein the control program activates the electronic link to access the interactive file.

2. The electronic book viewer according to claim 1, wherein the interactive file is stored at one or more of the data storage device, an Internet web site, an intranet web site, an electronic library and an operations center.

3. The electronic book viewer according to claim 1, wherein the electronic link comprises HTML links.

4. The electronic book viewer according to any one of claims 1 to 3, wherein the interactive file includes an embedded exercise.

5. The electronic book viewer according to claim 4, wherein the embedded exercise, comprises:

a header file, the header file, comprising:

a name block,

a password block,

a date block, and

- a time block;
 - an exercise file, the exercise file, comprising:
 - a question block, and
 - an answer block;
 - an end block, the end block, comprising:
 - a help file,
 - an instruction file, and
 - software to execute a send command.
6. The electronic book viewer according to claim 5, wherein the name block includes software to recognize an authorized user name, the password block includes software to recognize a valid password, and wherein the time block includes a start time and end time for the embedded exercise, and wherein the end block includes software to present instructions from the instruction file for display on the viewer.
7. The electronic book viewer according to claim 6, wherein the control program controls an operation of the embedded exercise, wherein the control program presents the question block upon recognizing a valid password.
8. The electronic book viewer according to claim 7, wherein the control program includes software to receive an answer in the answer block, to limit a size of the answer block, and to present a next question upon completion of a prior answer.
9. The electronic book viewer according to claim 8, wherein the control program includes software to adjust a size of the answer block.
10. The electronic book viewer according to claim 9, wherein the control program is operable to enter answers input from one of a keyboard, an external calculator, a personal computer, a library unit, and an electronic note pad.

11. The electronic book viewer according to any one of claims 7 to 10, wherein the interactive electronic book is coupled to a data base, the data base including questions of varying degrees of difficulty, wherein the control program includes software that randomly selects a plurality of questions from the data base to present in the exercise file, an initial selection of the plurality of questions including questions having a first level of difficulty.
12. The electronic book viewer according to claim 11, wherein upon successful completion of the initial selection, the control program selects a second selection of the plurality of questions having a level of difficulty greater than the initial selection, the control program presenting the second selection in the exercise file.
13. The electronic book viewer according to claim 11, wherein upon unsuccessful completion of the initial selection, the control program selects a second selection of the plurality of questions having a level of difficulty equal to or less than the initial selection, the control program presenting the second selection in the exercise file.
14. The electronic book viewer according to claim 1, wherein the interactive file is an embedded exercise having one or more questions and a corresponding one or more answer blocks.
15. The electronic book viewer according to claim 14, wherein the embedded exercise is a timed exercise.
16. The electronic book viewer according to claim 15, wherein the control program prevents access to the embedded exercise upon expiration of a time limit.
17. The electronic book viewer according to claim 16, wherein the control program provides a warning when time is running out.

18. The electronic book viewer according to claim 17, wherein the control program indicates when time has expired.
19. The electronic book viewer according to claim 18, wherein the control program controls a length of an answer in the answer block.
20. The electronic book viewer according to claim 19, wherein the one or more questions are multiple choice questions.
21. The electronic book viewer according to claim 20, wherein the control program computes a number of correct answers to the one or more multiple choice questions, and displays the number of correct answers on the display.
22. The electronic book viewer according to claim 21, wherein the control program calculates a performance based on other user scores, the performance indicated in a statistics block on the display.
23. The electronic book viewer according to claim 21, wherein the control program calculates a performance on a current embedded exercise, the performance displayed in a statistics block on the display.
24. The electronic book viewer according to any one of claims 1 to 23, wherein the interactive electronic book further comprises a security program, wherein the security program limits access to the interactive file based on an inputted authorized user identification.
25. The electronic book viewer of claim 1, wherein the interactive file includes one of sample problems, a quiz, a puzzle, a purchase request and a questionnaire.
26. The electronic book viewer of claim 1, wherein the interactive file includes an electronic book subscription service, comprising:

a periodic file provided to subscribers to the book subscription service, the periodic file, comprising:

- a list of currently available electronic books,
- a preview of selected ones of the currently available electronic books, and
- a price of the currently available electronic books; and

a purchase file, comprising:

- an identification field to indicate an identity of a purchaser, and
- a payment field to indicate a method of payment.

27. The electronic book viewer of claim 1, wherein the interactive file is a book suggestion file, the book suggestion file comprising:

- a subscriber preference input file;
- a database of electronic book data; and

a processor coupled to the preference file and the database, the processor including a search engine that compares data in the preference file to data in the database to create a book suggestion file, wherein the book suggestion file is displayed on an electronic book viewer.

28. The electronic book viewer of claim 27, wherein the book suggestion file includes a book order field, wherein a subscriber may purchase a suggested electronic book.

29. The electronic book viewer of claim 27, wherein the search engine executes a responsive search based on subscriber menu entries.

30. The electronic book viewer of claim 29, wherein the responsive search is based on responses to one or more of mood questions, author questions, and keyword questions.

31. The electronic book viewer of claim 27, wherein the search engine executes an intelligent search based on analysis of data provided by a subscriber.

32. The electronic book viewer of claim 31, wherein the intelligent search includes analysis of one or more of subscriber profile data and subscriber books read data.
33. The electronic book viewer of claim 1, further comprising an interactive file menu, the interactive file menu including a link to the interactive file, wherein the menu includes a list of available interactive files, and wherein activation of the link connects the menu to the interactive file, the interactive file being displayed on a screen of a viewer.
34. The electronic book viewer of claim 1, wherein the interactive file comprises a medical diagnosis tool, wherein the medical diagnosis tool presents questions concerning a patient's condition, receives responses, analyzes the responses, and provides prompts for diagnosing the patient's condition.
35. The electronic book viewer of claim 1, wherein the interactive file is a troubleshooting tool, wherein the troubleshooting tool presents questions concerning a system status, receives responses, analyzes the responses, and provides prompts for analyzing the system status.
36. The electronic book viewer of claim 1, wherein the interactive file is a system inspection tool, wherein the system inspection tool presents a first step in an inspection process, receives a first response, and then presents a second and subsequent steps, only after receiving a second and subsequent responses, respectively.
37. The electronic book viewer of claim 36, wherein the system inspection tool is a system alignment check, wherein the system alignment check receives data related to an alignment of a system and stores the data in a file associated with the system.
38. The electronic book viewer of claim 37, wherein the system alignment check provides an indication when the system is out of alignment.

39. The electronic book viewer of claim 1, wherein the interactive file is a vocational training tool, the vocational tool presenting a first text section and summary questions related to the first text section, wherein a user enters responses to the summary questions and the vocational tool analyzes the responses, and wherein the vocational tool presents additional material to the user when the analysis indicates the user lacks comprehension.

40. The electronic book viewer of claim 1, wherein the interactive file is a vocational training tool, the vocational tool comprises a plurality of text sections, and wherein the vocational tool advances to a next text section upon completion of summary questions associated with a prior text section.

41. The electronic book viewer of claim 1, wherein the interactive file is an interactive dictionary, wherein the interactive dictionary presents a definition, a pronunciation and a spelling of a word entered into the interactive dictionary.

42. The electronic book viewer of claim 41, wherein the pronunciation is an audio presentation.

43. The electronic book viewer of claim 1, wherein the interactive file is one or more of an address book and contact manager, an interactive calendar and schedule, an interactive survey, wherein survey questions are presented and responses received, and an inventory manager, the inventory manager indicating a current status of inventory items, wherein the status is updated based on inputs to the inventory manager.

44. The electronic book viewer of claim 43, wherein the electronic book viewer provides modifications to a central inventory system based on the status updates.

45. The electronic book viewer of claim 44, wherein the modifications are provided using a communications system.

46. The electronic book of viewer claim 45, wherein the communications system comprises one or more of a wired telephone system, a wireless telephone system, a wired data system, and a wireless data system.

47. The electronic book viewer of claim 1, wherein the interactive file is a facsimile sending and receiving system.

48. The electronic book viewer of claim 1, wherein responses to the interactive file are stored in the data storage device.

49. The electronic book viewer of claim 1, wherein responses to the interactive file are stored in an external location.

50. The electronic book viewer of claim 49, wherein the external location is one or more of an Internet web site, an intranet web site, and an operations center.

51. The electronic book viewer of claim 1, wherein responses to the interactive file are transmitted to a remote site by operation of a send button on the electronic book viewer.

52. An interactive electronic book system comprising:

an operations center that provides an interactive electronic book, comprising:

a data combiner that combines text and graphical data, and electronic links to produce the interactive electronic book,

a digital compression unit for compressing the interactive electronic book to produce compressed data, and

a transmitter for transmitting the compressed data to a remote location;

an electronic book viewer, comprising:

a receiver for receiving the compressed data from the remote location,

a decompressor for decompressing the received data,

a memory for storing the decompressed data,

a processor for processing the stored data, and
a display for displaying the processed data as the interactive electronic
book; and

interactive files linked to the interactive electronic book by the electronic links,
wherein the interactive files are stored in a file remote from the interactive electronic
book.

53. The system of claim 52, wherein the interactive files are stored in the memory.

54. The system of claim 52, wherein the interactive files are stored at a location
external to the electronic book viewer.

55. The system of claim 54, wherein the external location is one or more of a library
unit, wherein the library unit is operably coupled to the electronic book viewer, a cable
television headend, the operations center, wherein the operations center is a component of
a television program delivery system, an Internet web site, an electronic bookstore, a
library, and a node in a telecommunications network.

56. The system of claim 55, wherein the television program delivery system is one or
more of a cable television system, a satellite television system, a wireless television
system, and a broadcast television system.

57. The system of claim 55, wherein the telecommunications network is one or more
of a wired network and a wireless network.

58. The system of claim 57, wherein the wired network is one or more of a public
switched telephone network and a wired data network.

59. The system of claim 57, wherein the wireless network is one of a wireless local
area network, a digital cellular network, an analog cellular network, a digital pager
network, and a personal communications network, and wherein the wireless network

supports one or more of Global Systems for Mobile Communications (GSM) standards, time division multiple access (TDMA), code division multiple access (CDMA), and Advanced Mobile Telephone System (AMPS) protocols.

60. The system of claim 57, wherein the wired data network is one of a metallic wired network and a fiber wired network, wherein the wired data network supports one or more of HDSL, ADSL, DSL, ISDN, T1, T3, SONET, ATM, X. 25, frame relay, and Switched MultiMegabit Data Service protocols.

61. The system of claim 52, wherein the viewer further comprises a menu system, the menu system including a menu displaying the interactive files.

62. The system of claim 61, wherein the menu includes electronic links to the interactive files, and wherein the interactive files can be accessed from the menu.

63. The system of claim 52, wherein the processor includes a control program that controls access to and operation of the interactive files.

64. The system of claim 52, wherein the interactive files include embedded exercises comprising one or more of multiple choice questions, true/false questions, essay questions, and math questions.

65. The system of claim 52, wherein the interactive files include a foreign language tutor.

66. The system of claim 65, wherein the electronic book viewer further comprises an audio unit, and wherein the foreign language tutor includes an audio display of a pronunciation of a foreign word.

67. The system of claim 52, wherein the electronic book viewer further includes a user interface that receives commands and data from a user.

68. The system of claim 67, wherein the user interface is one of a wired keyboard, a wireless keyboard, a mouse, a trackball, a soft keyboard, a touch sensitive screen, a touch sensitive pad, an external calculator, an interactive stylus and pad, and an interactive stylus and screen.

69. A method for producing an interactive electronic book, the method comprising:

creating an electronic book file, the electronic book file comprising:

electronic text and graphics data,

an electronic link, wherein said electronic link is coupled to the text and graphics data, and

a control program coupled to the electronic link;

creating an interactive file;

storing the interactive file in a location remote from the electronic book file;

associating the interactive file to the electronic book file.

70. The method according to claim 69, wherein the control program is operable to activate the electronic link to access the interactive file.

71. The method according to claim 69 or claim 70, wherein the associating step comprises linking the interactive file to a location in the electronic text and graphics data using the electronic link.

72. The method according to any one of claims 69 to 71, wherein the electronic link is an HTML link.

73. The method according to any one of claims 69 to 72, wherein the storing step comprises storing the interactive file in at least one a memory in an electronic book viewer, an Internet web site, an intranet web site and an operations center.

74. The method according to any one of claims 69 to 73, wherein the step of creating the interactive file comprises creating an embedded exercise.

75. The method according to claim 74, wherein the step of creating the embedded exercise, comprises:

creating a header file, wherein the header file includes a location for entering user data;

creating an exercise file, wherein the exercise file includes a location for entering a response to the embedded exercise; and

creating an end block, wherein the end block includes a location that provides instructions for operating the embedded exercise.

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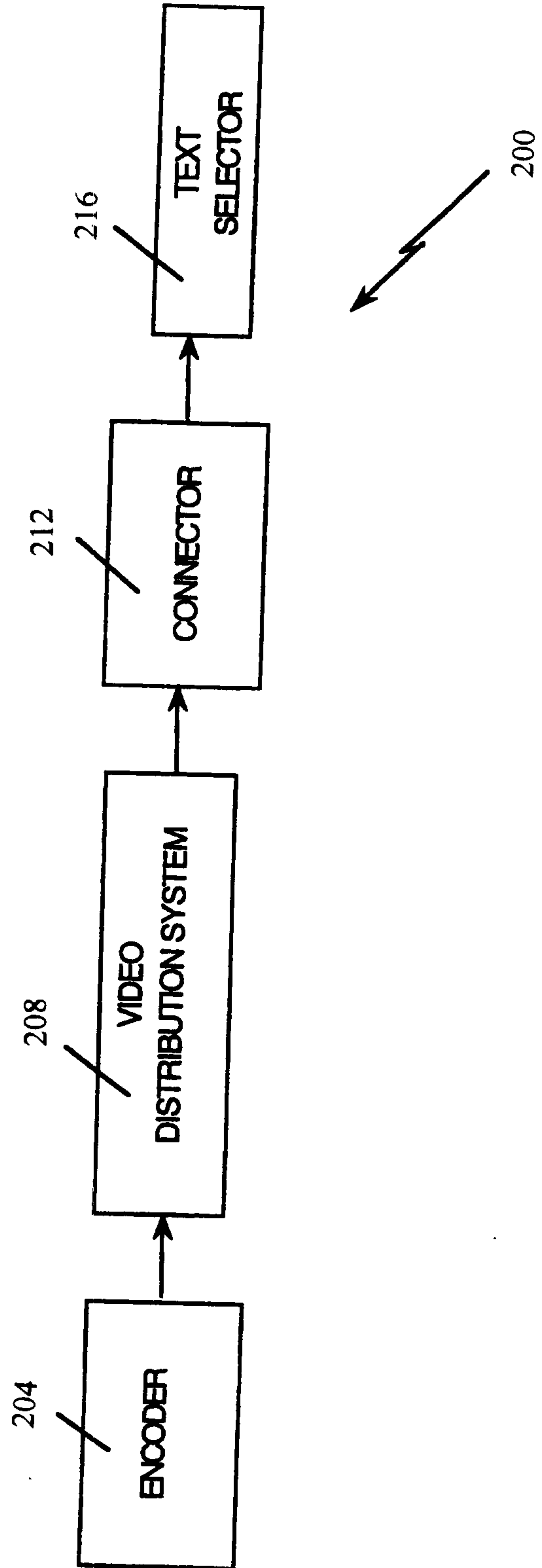


Fig. 1

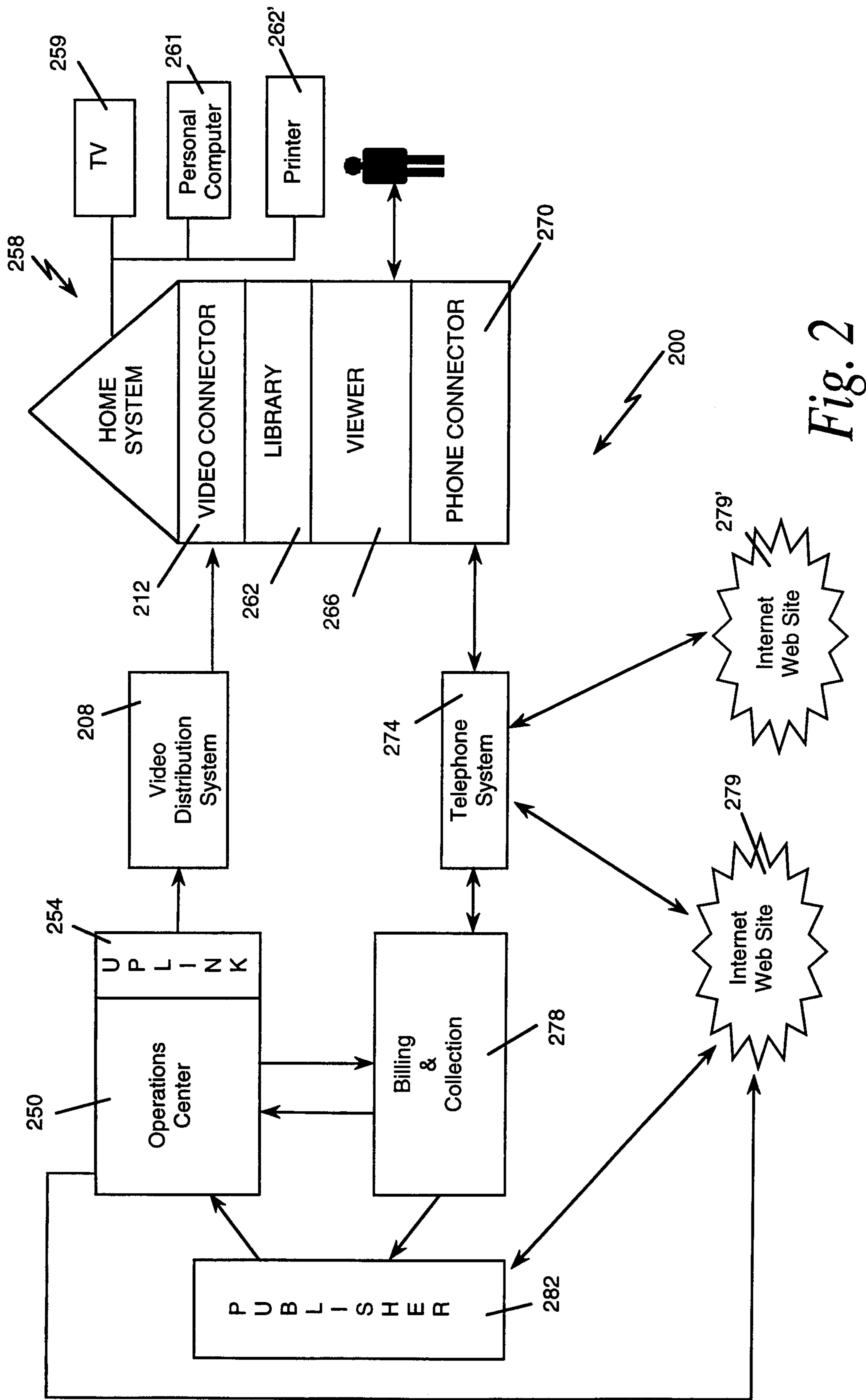


Fig. 2

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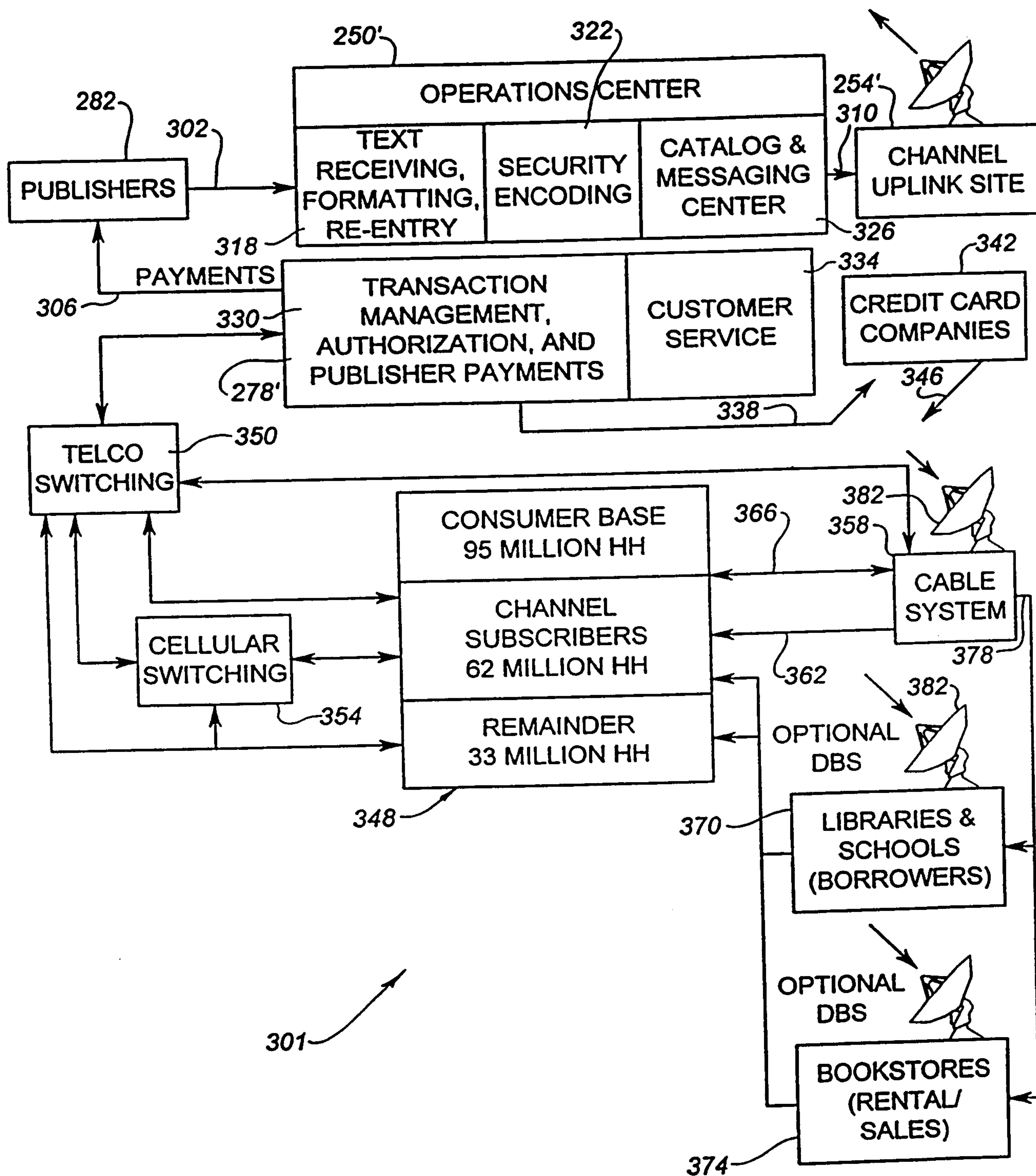


Fig. 3a

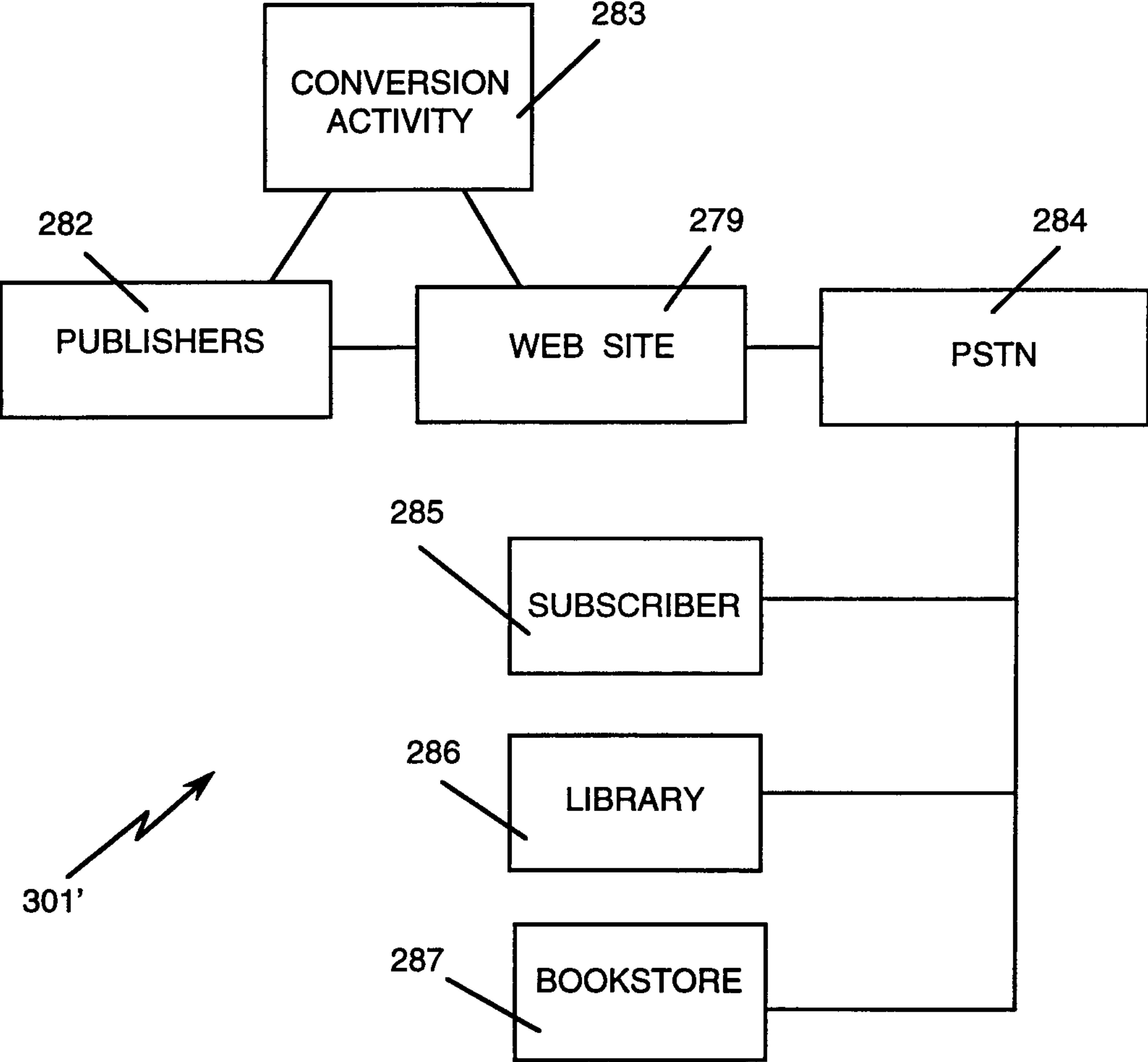


Fig. 3b

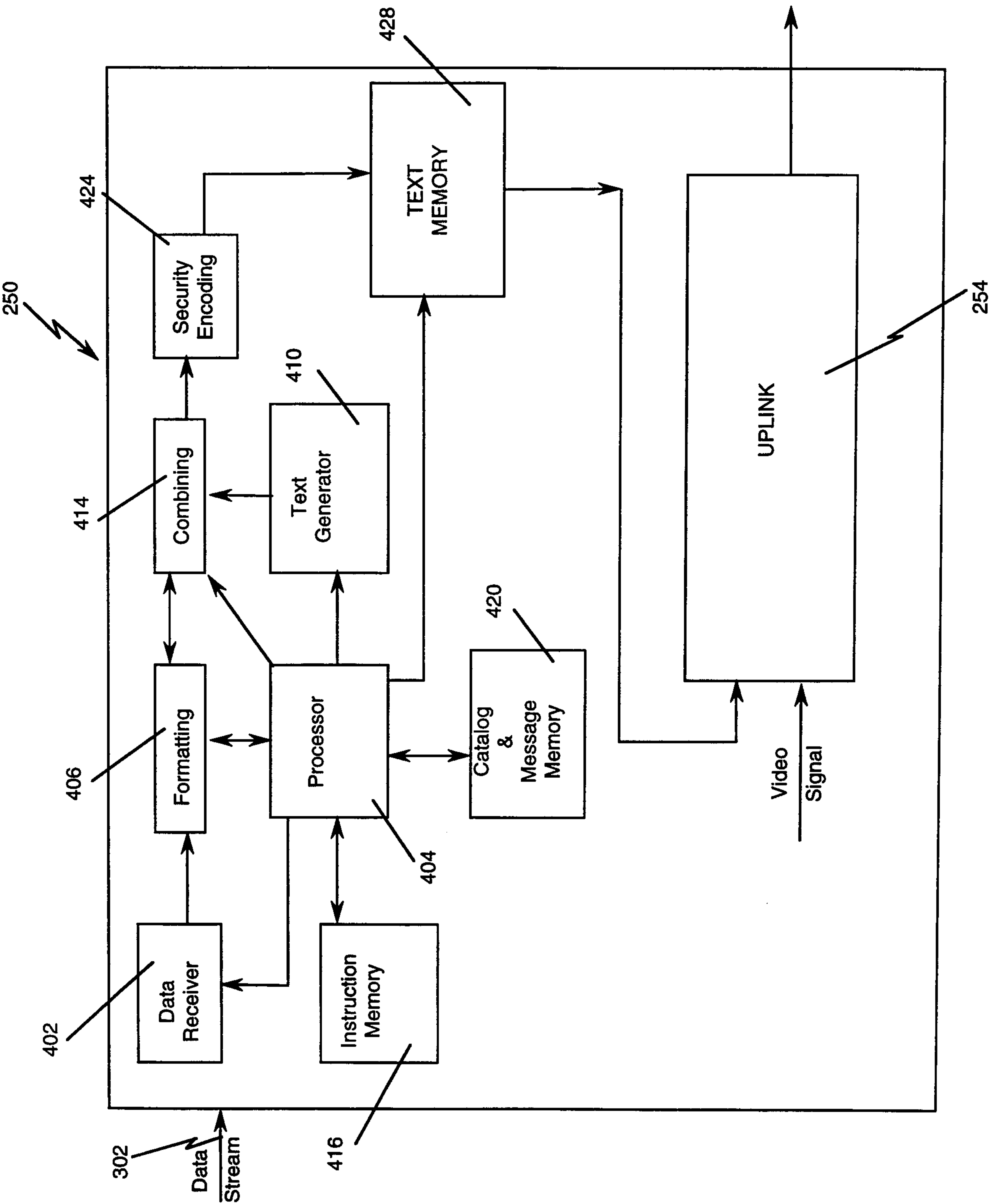


Fig. 4

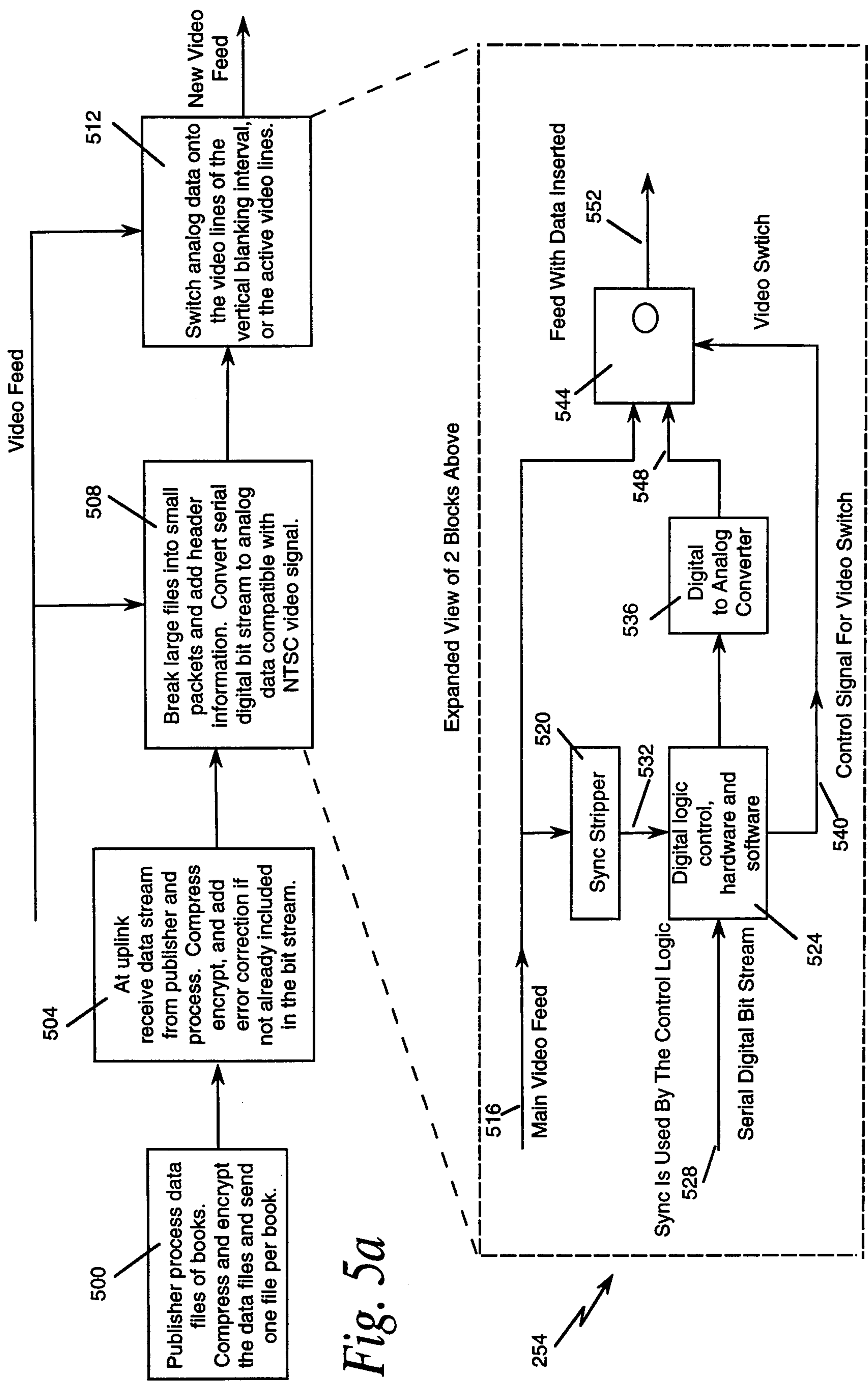


Fig. 5a

Fig. 5b

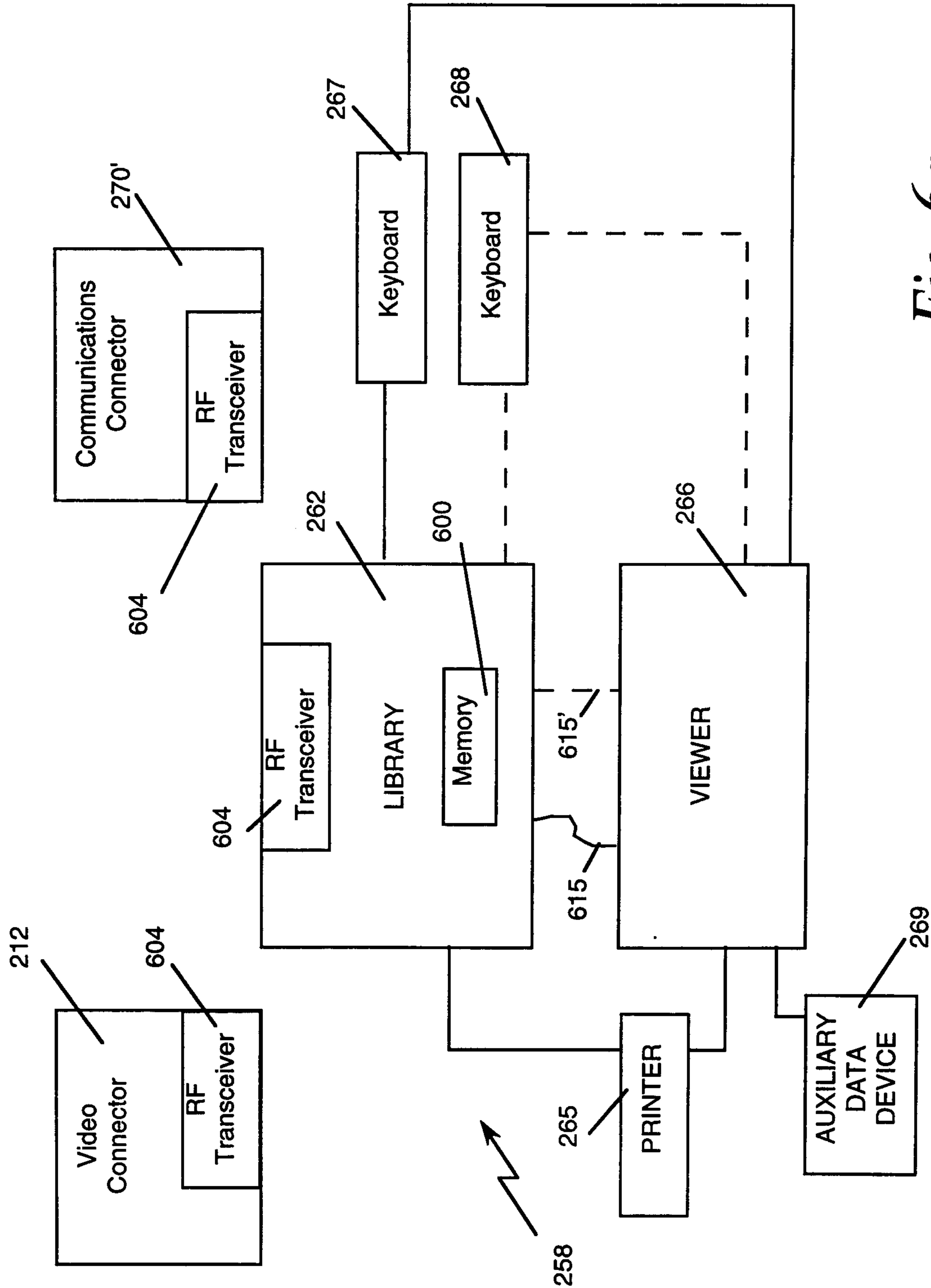


Fig. 6a

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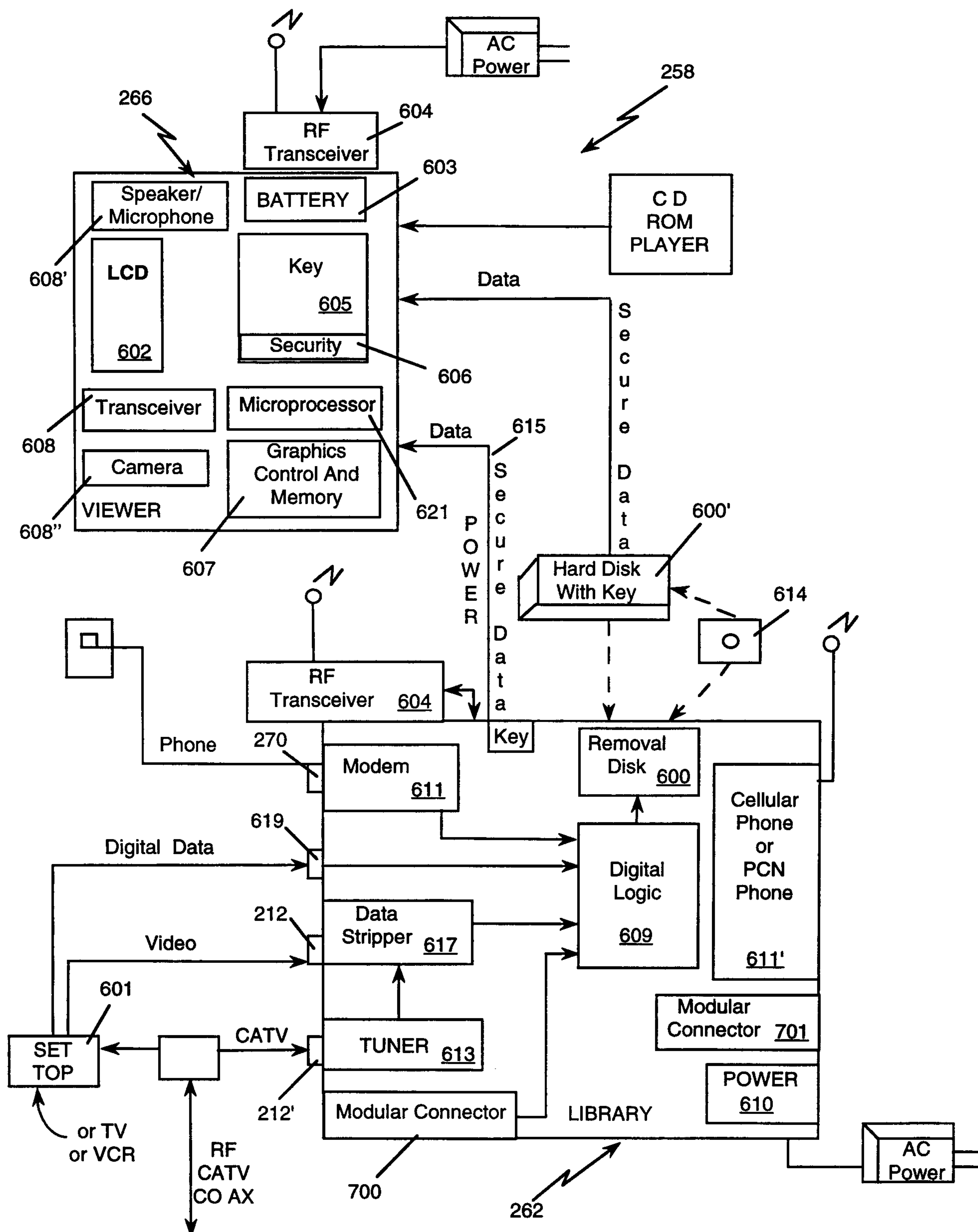
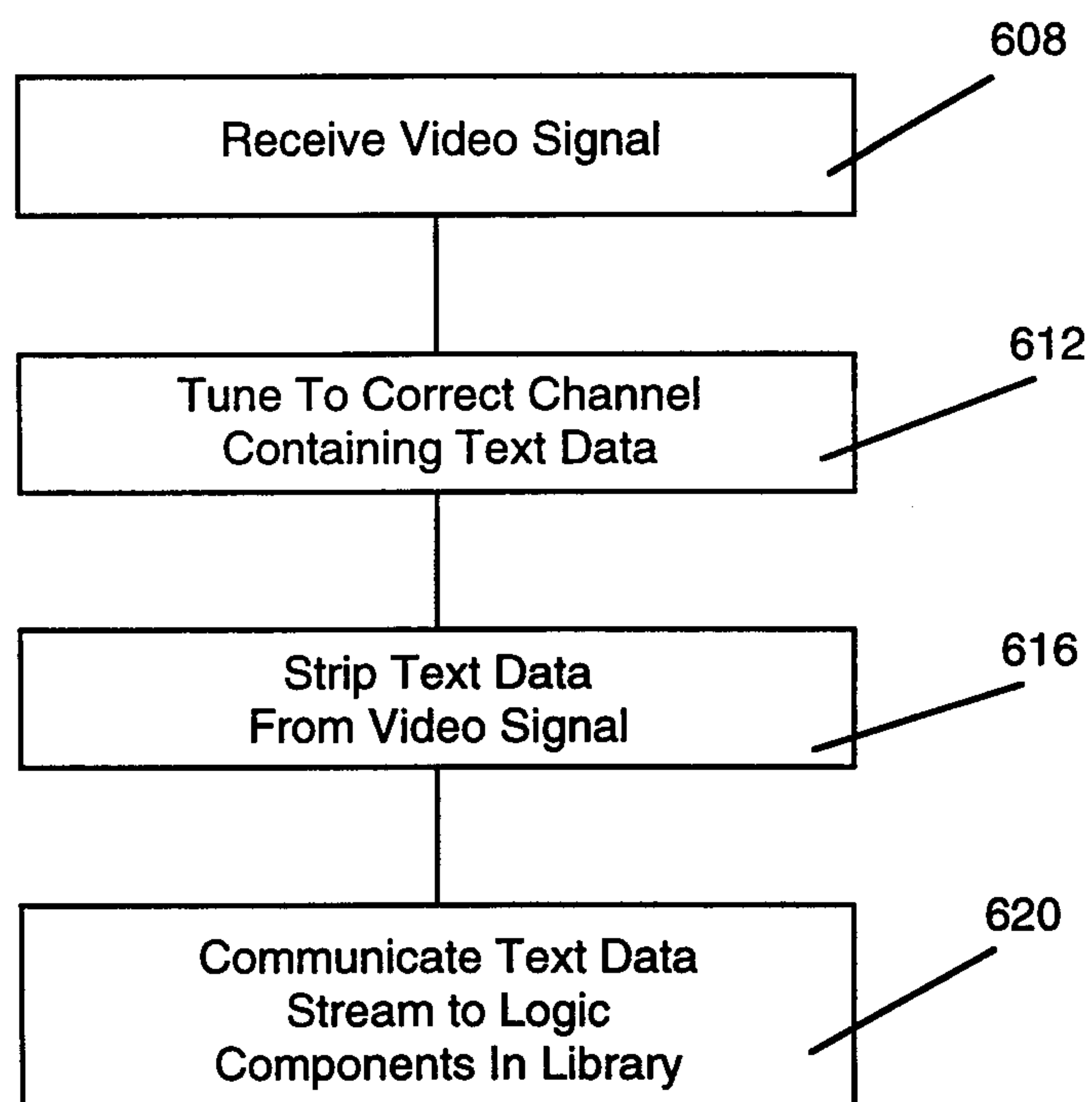
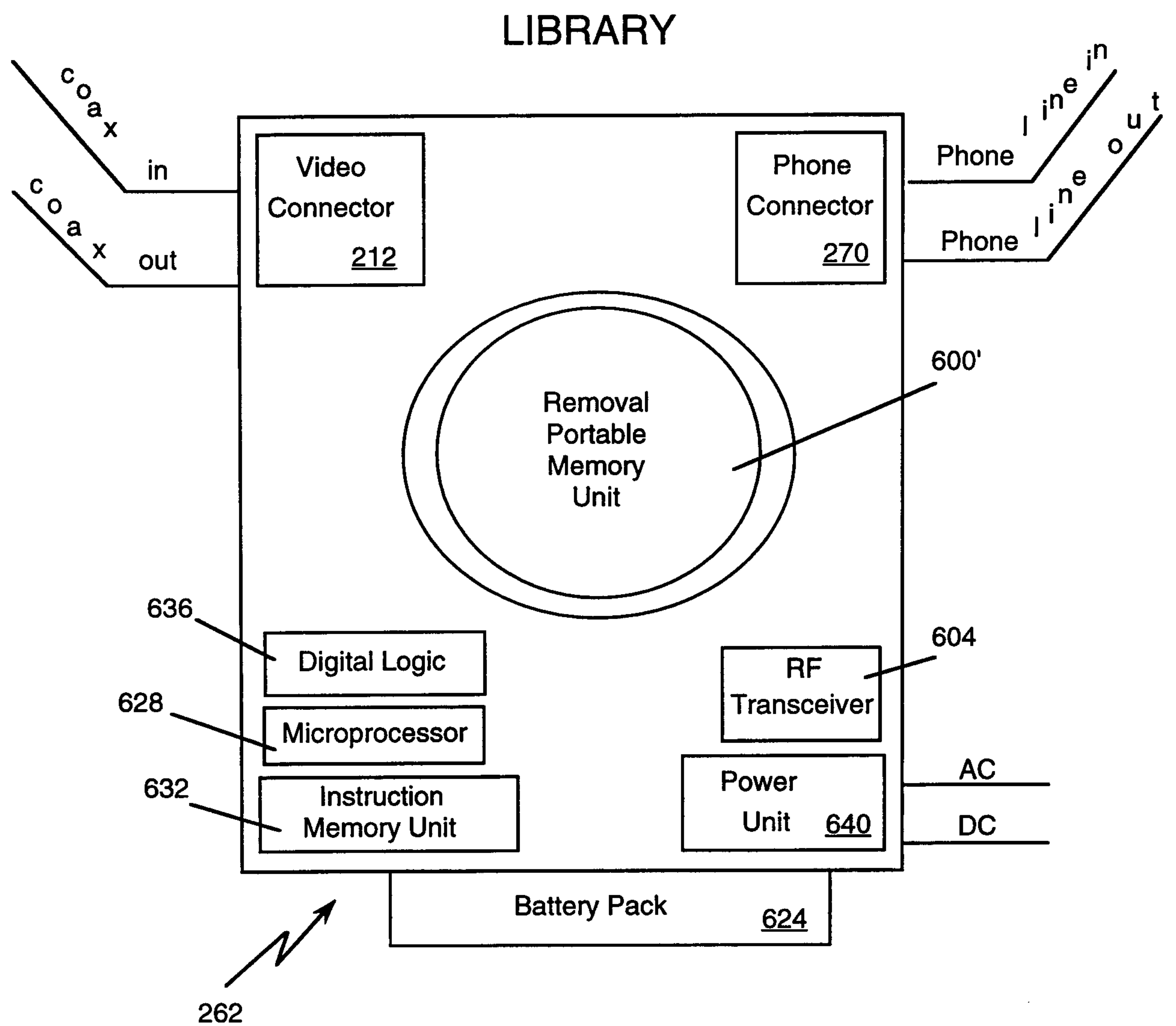


Fig. 6b

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*Fig. 7*

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*Fig. 8*

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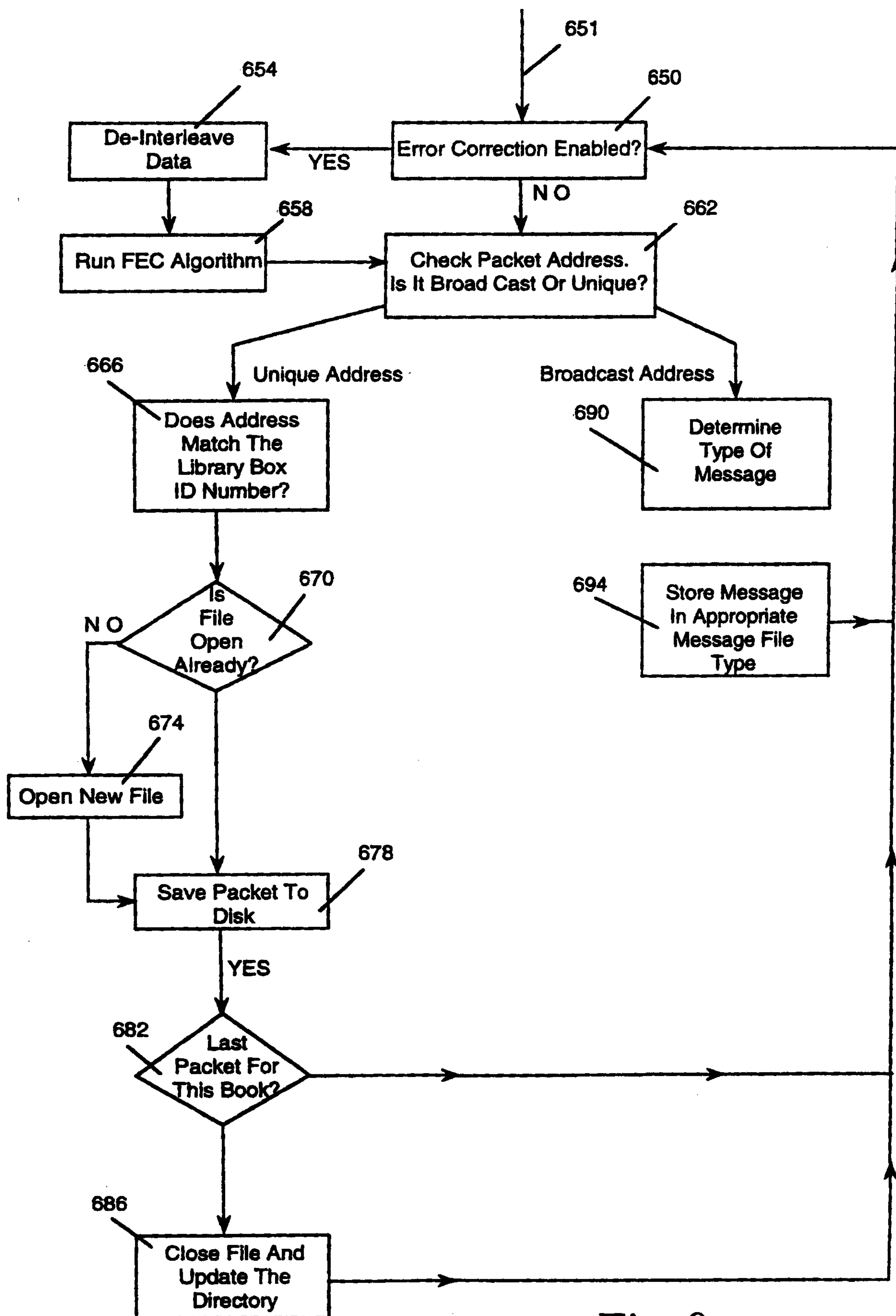
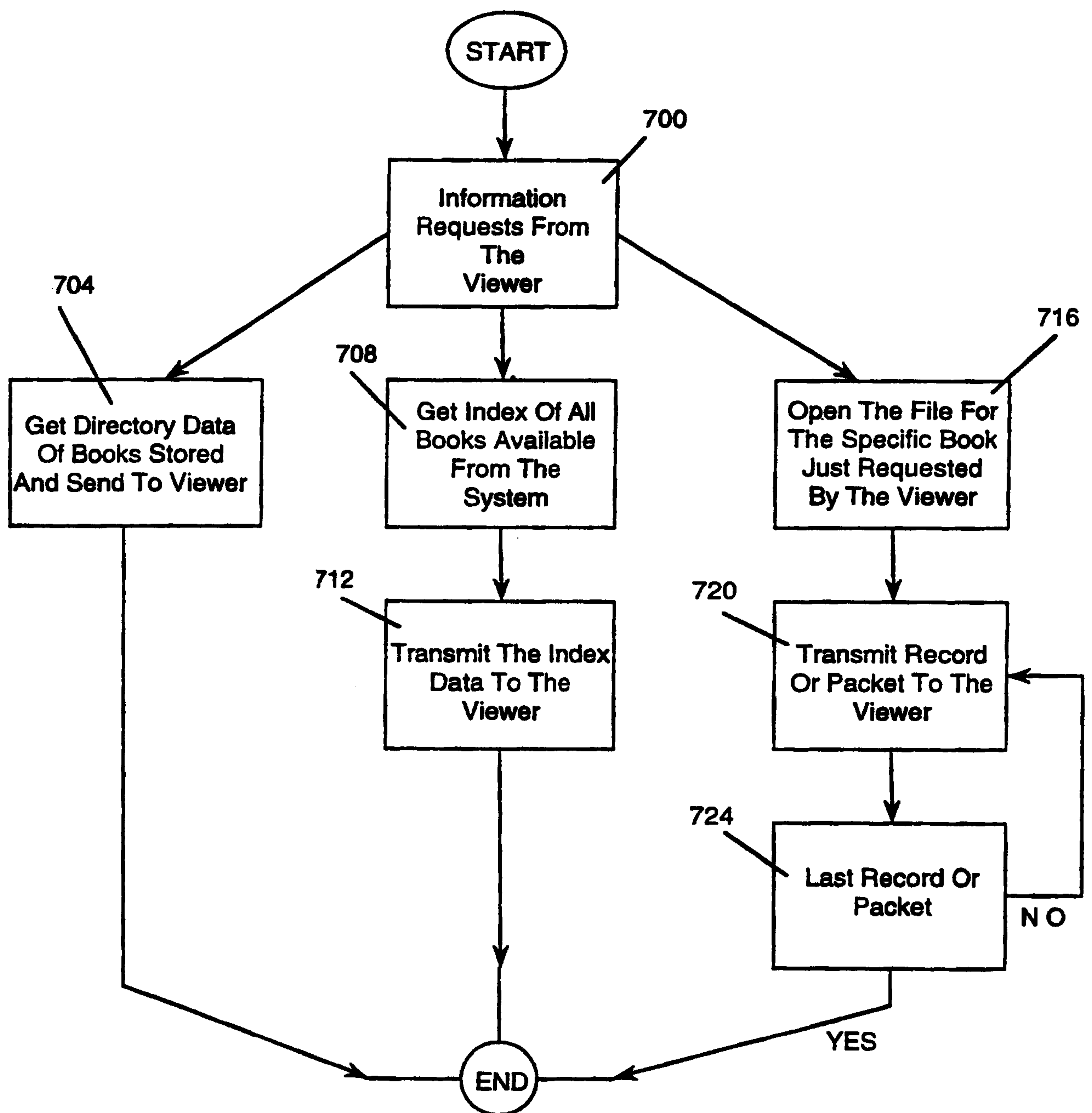


Fig. 9

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*Fig. 10*

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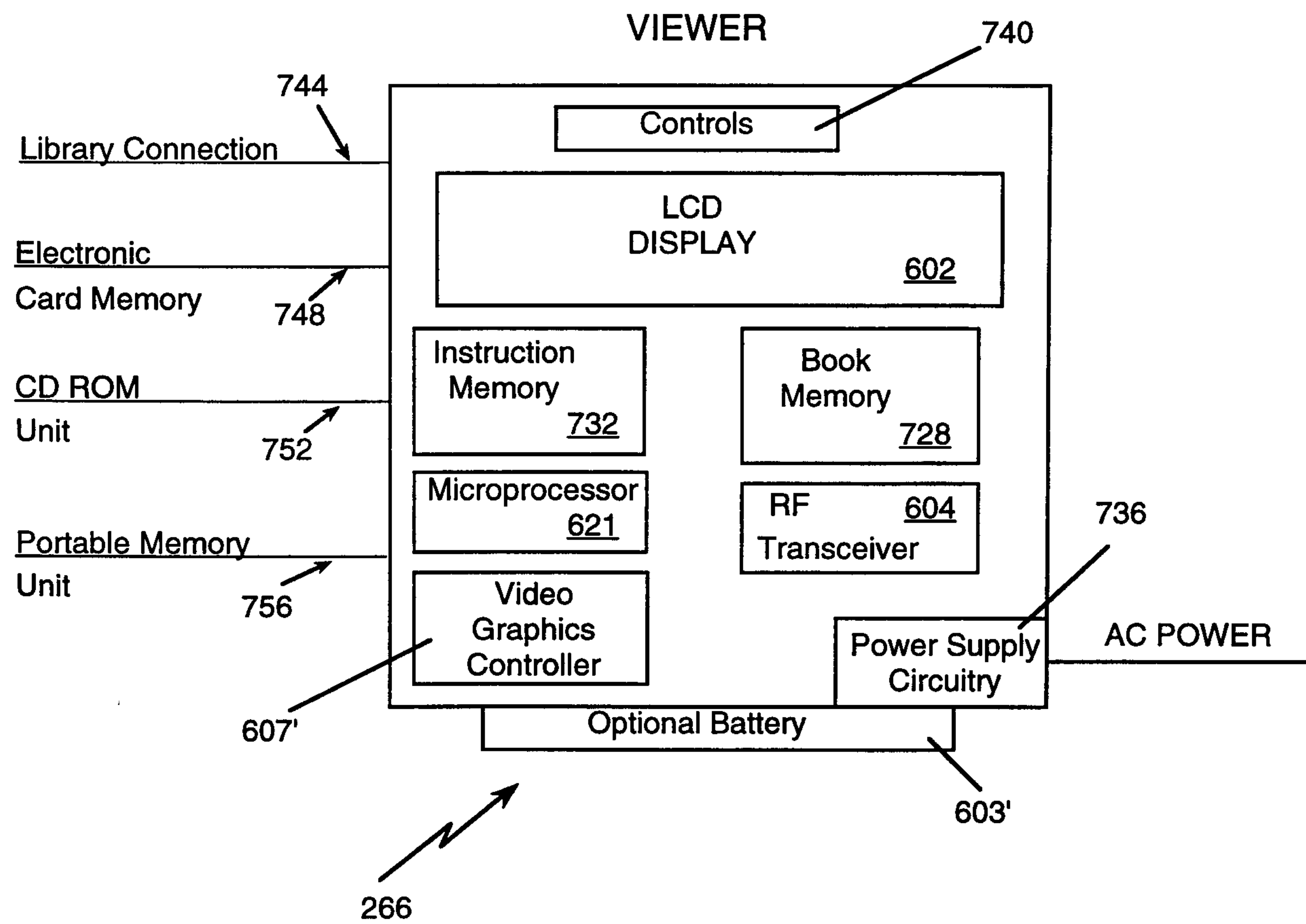
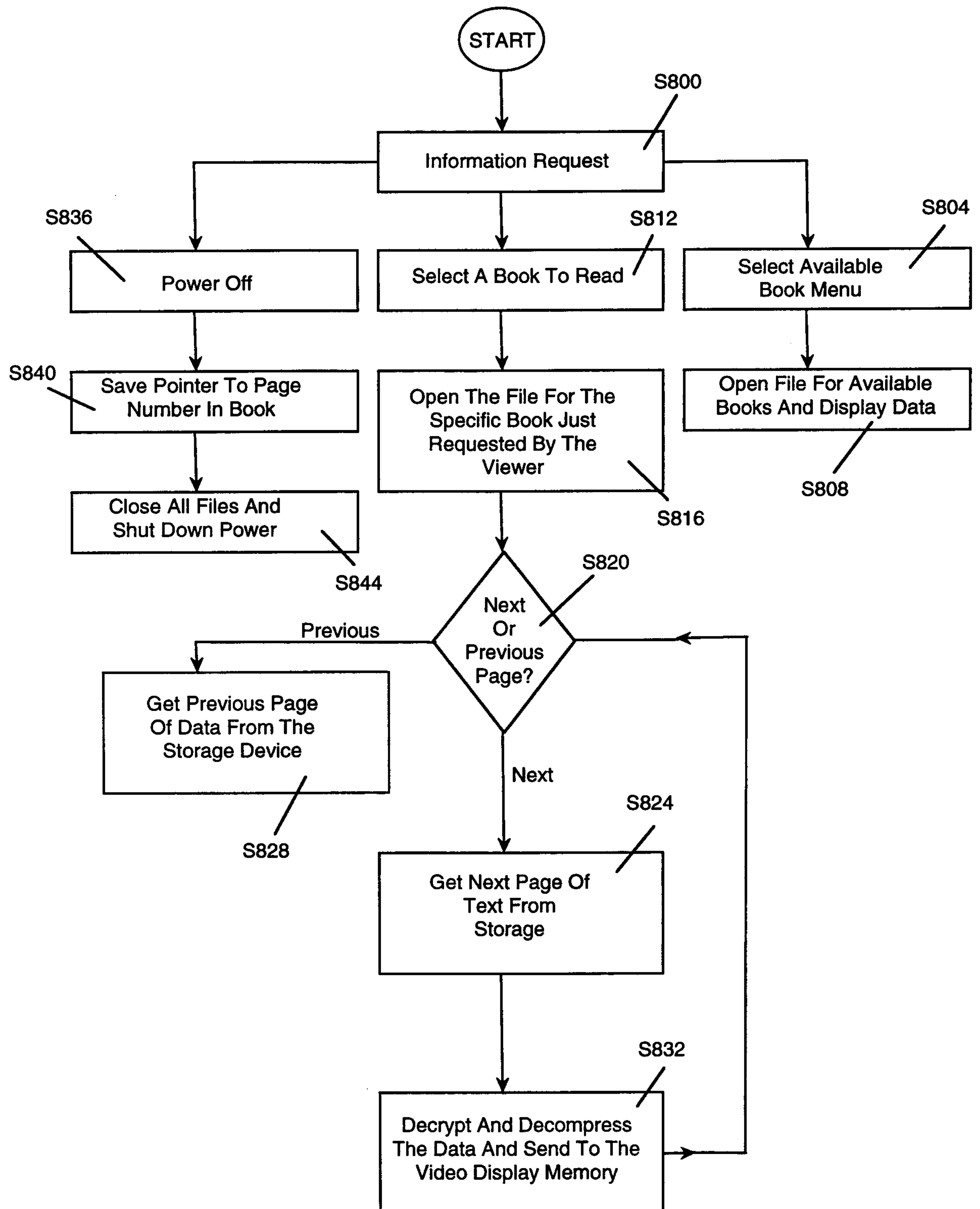


Fig. 11

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*Fig. 12*

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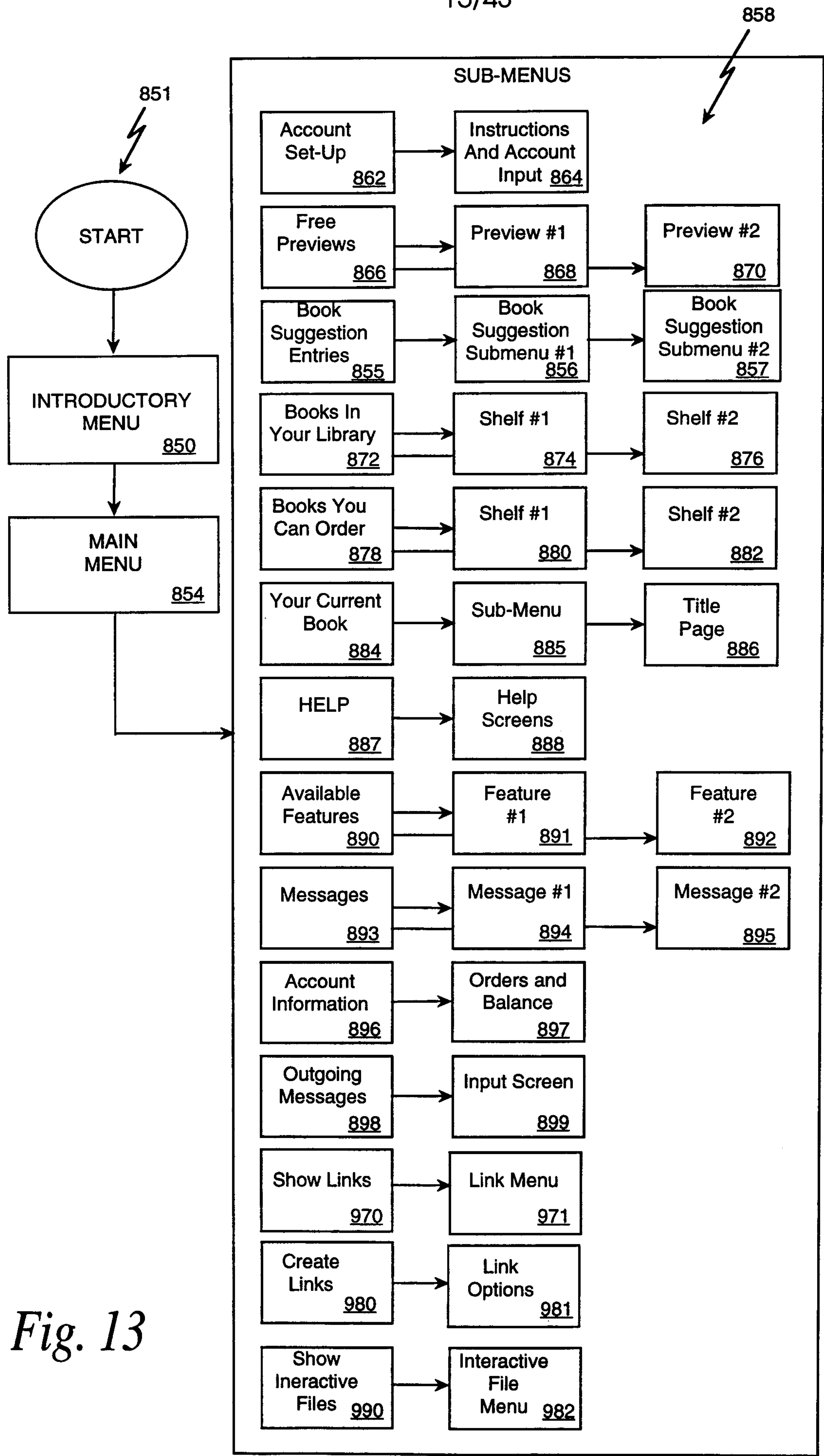
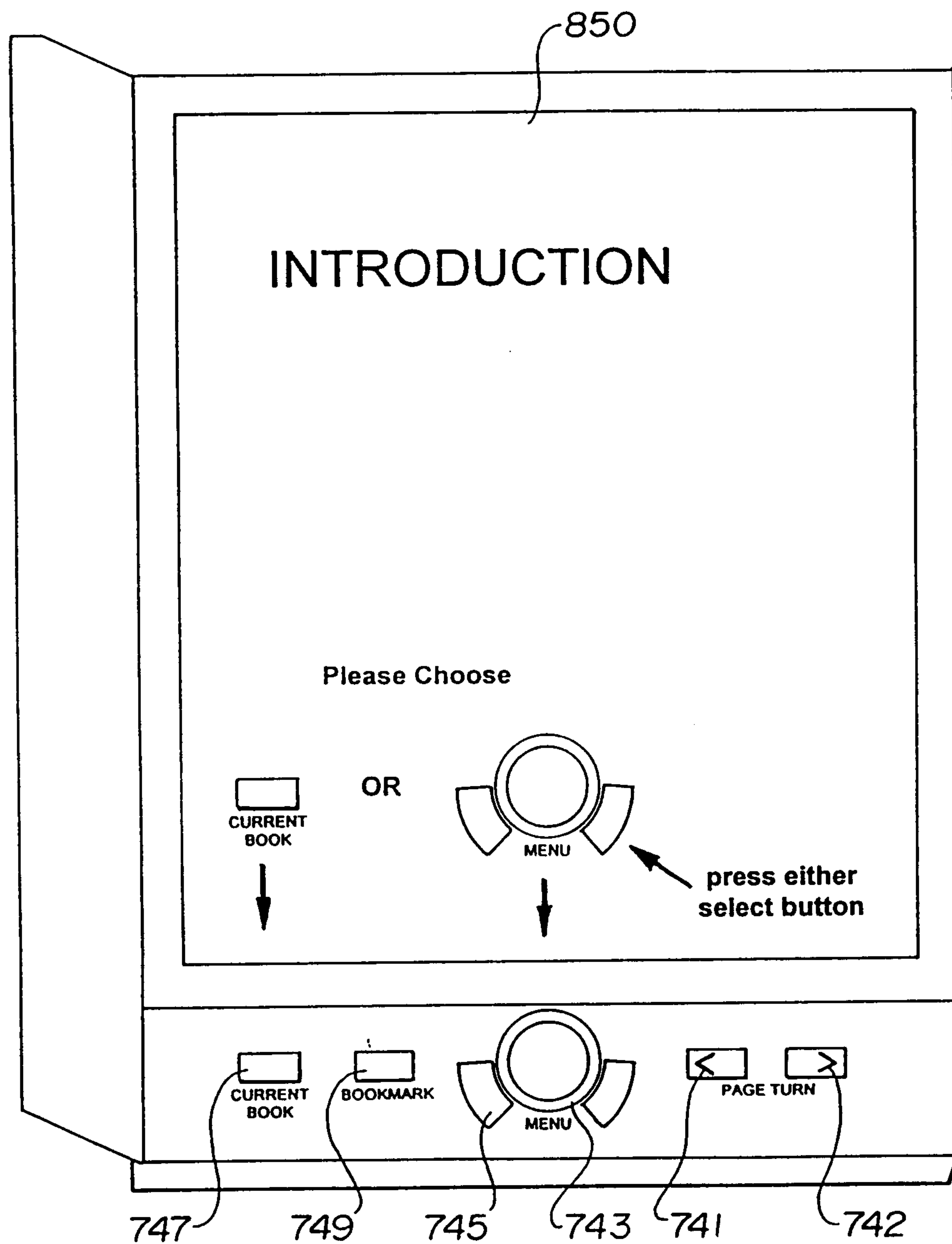


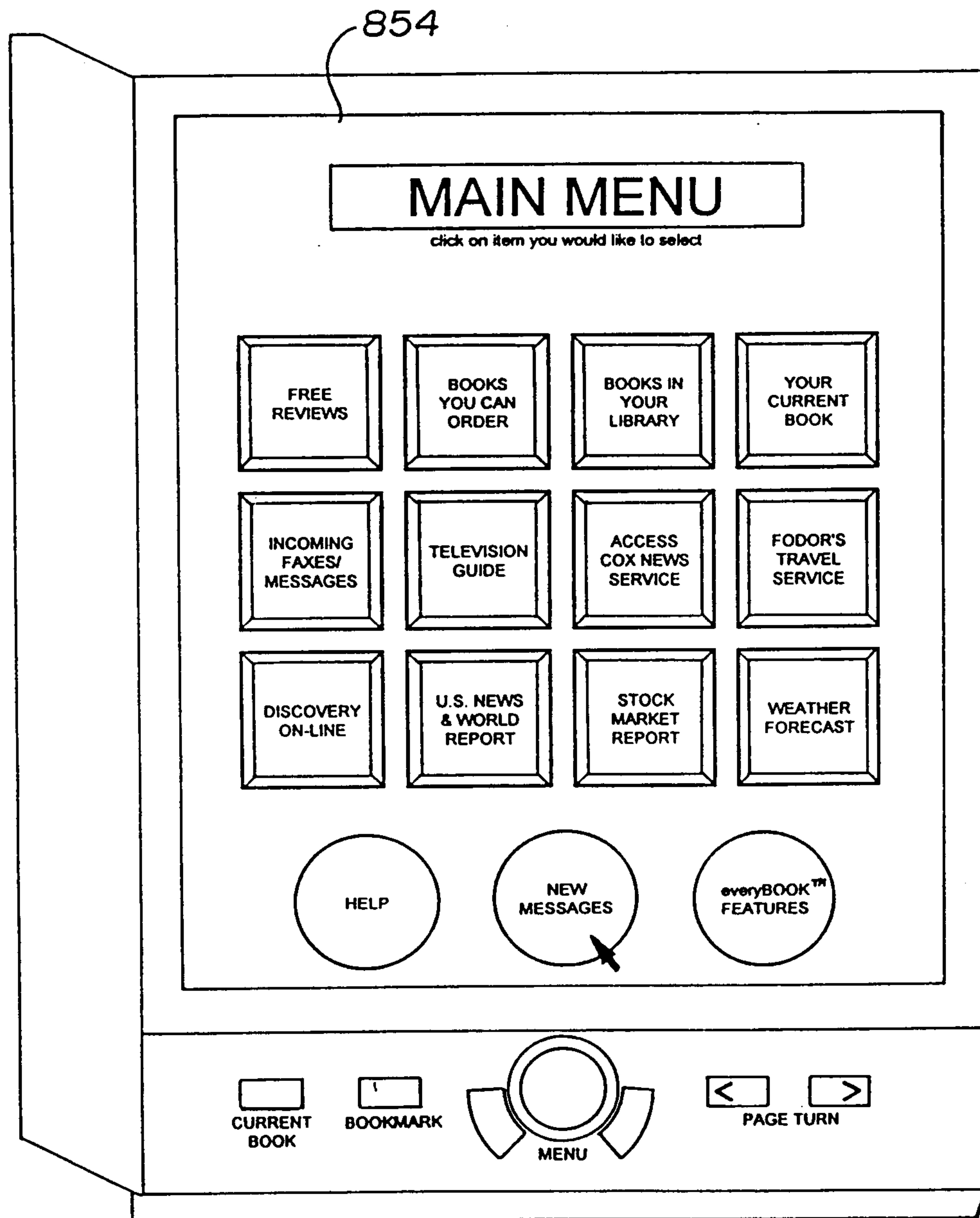
Fig. 13

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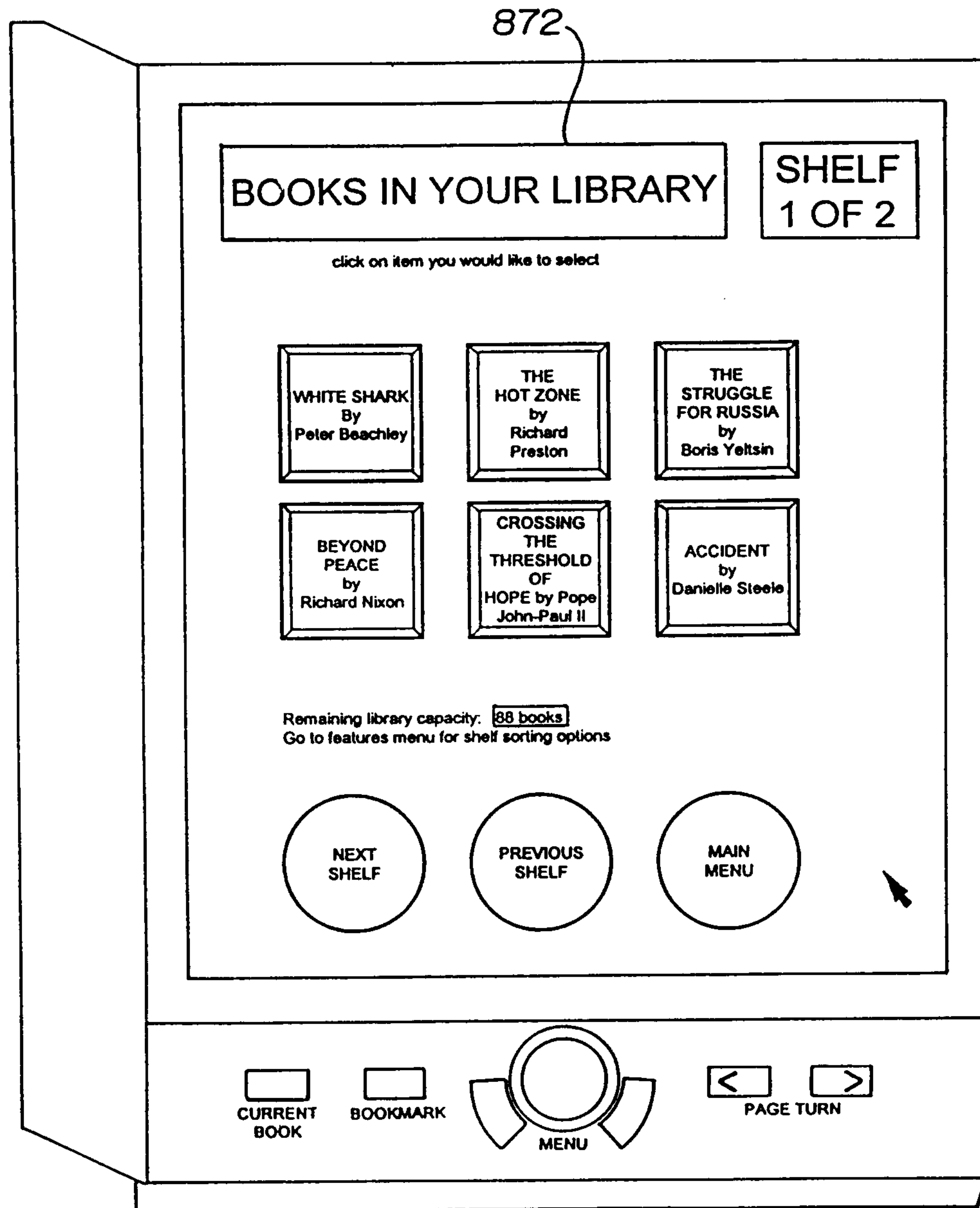
Fig. 14a

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Fig. 14b

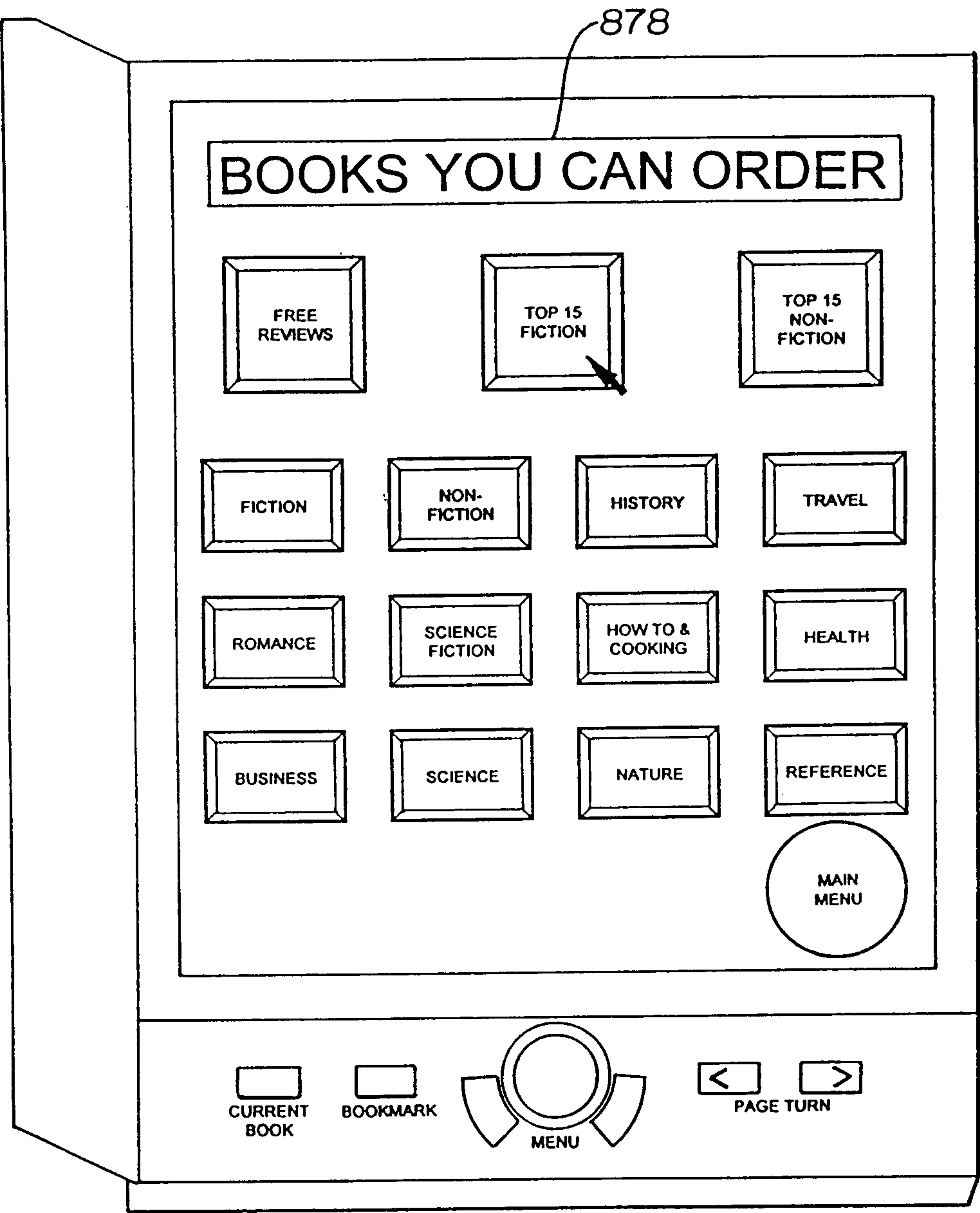


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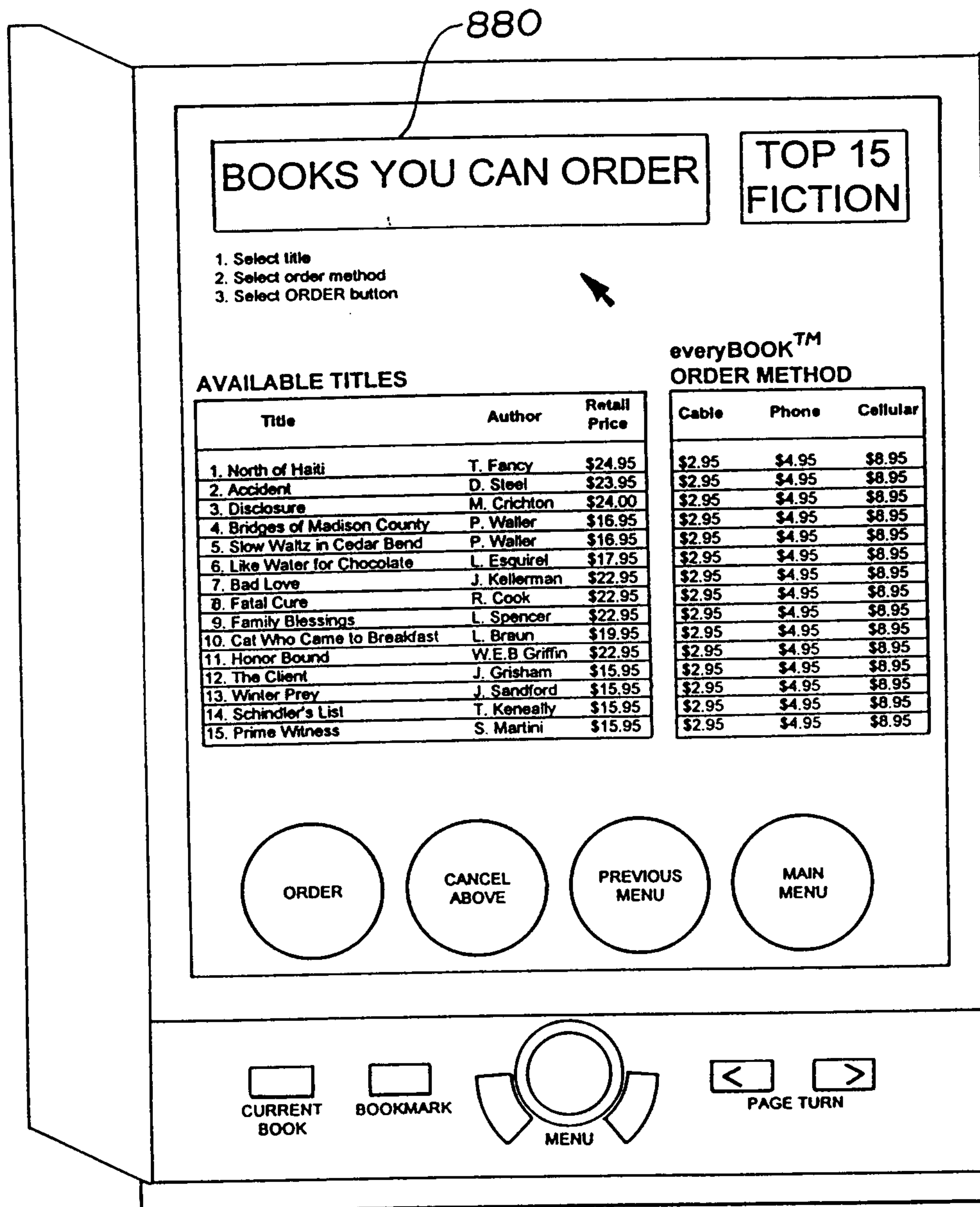
Fig. 14c

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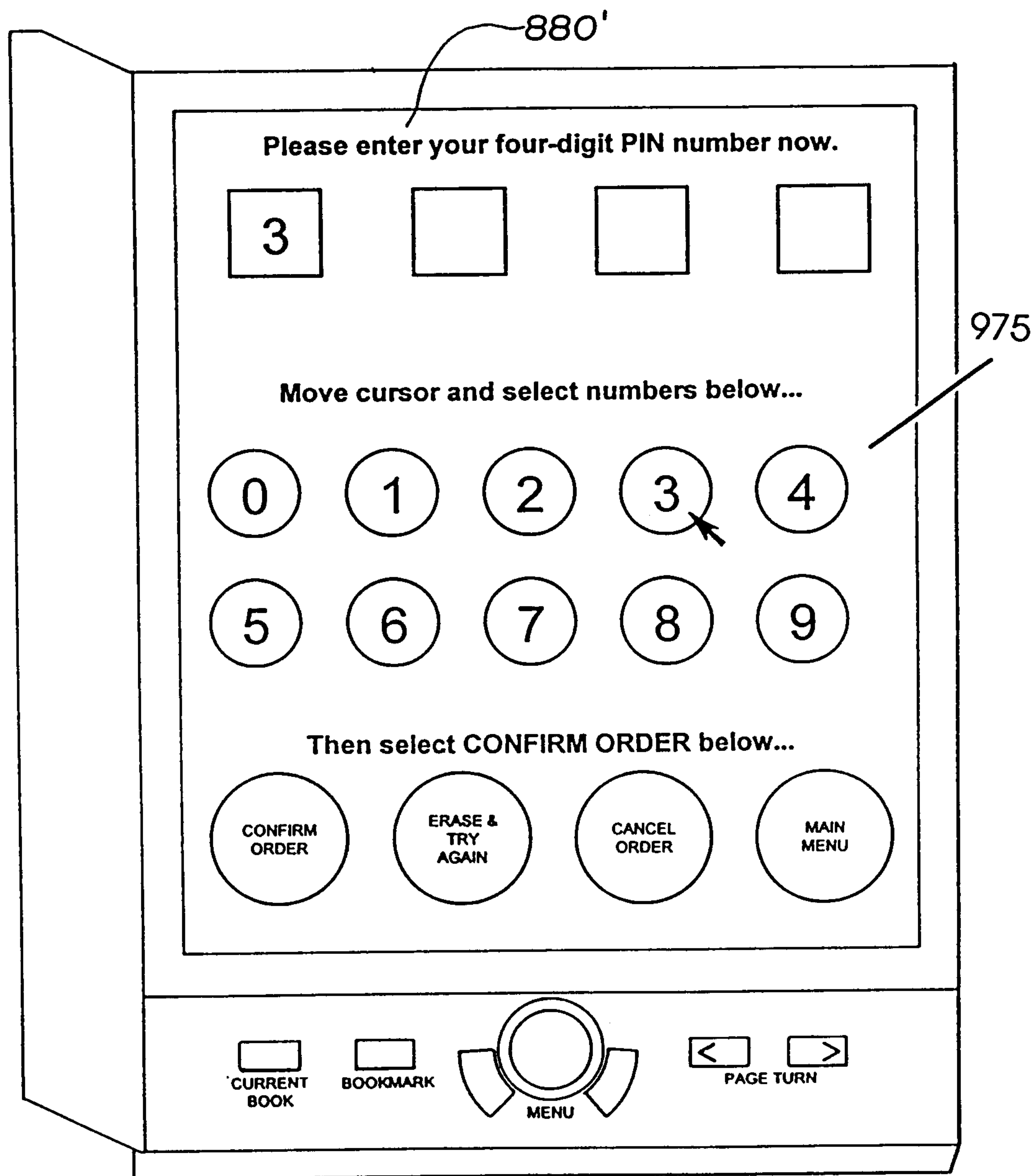
Fig. 14d



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Fig. 14e

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Fig. 14f

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Fig. 14g

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SET UP ACCOUNT **SCREEN 1 OF 6**

Step 1 Enter a four-digit PIN number to protect your credit card information.

3

Move cursor and select numbers below...

0	1	2	3	4
5	6	7	8	9

Write down your PIN code and keep it in a secure place.

CANCEL ORDER **MAIN MENU**

CURRENT BOOK **BOOKMARK** **MENU** **PAGE TURN**

Fig. 14h

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SET UP ACCOUNT

SCREEN
2 OF 6

Step 2

Select a credit card you wish to use for your everyBOOK™ purchase.

VISA

American Express

Discover

Step 3

Enter your credit card number and expiration date using keypad below.

exp. MM YY

Step 4

Enter your home phone number using the keypad below.

area code

0

1

2

3

4

ERASE & TRY AGAIN

CONFIRM & CONTINUE

5

6

7

8

9

CURRENT BOOK

BOOKMARK

MENU

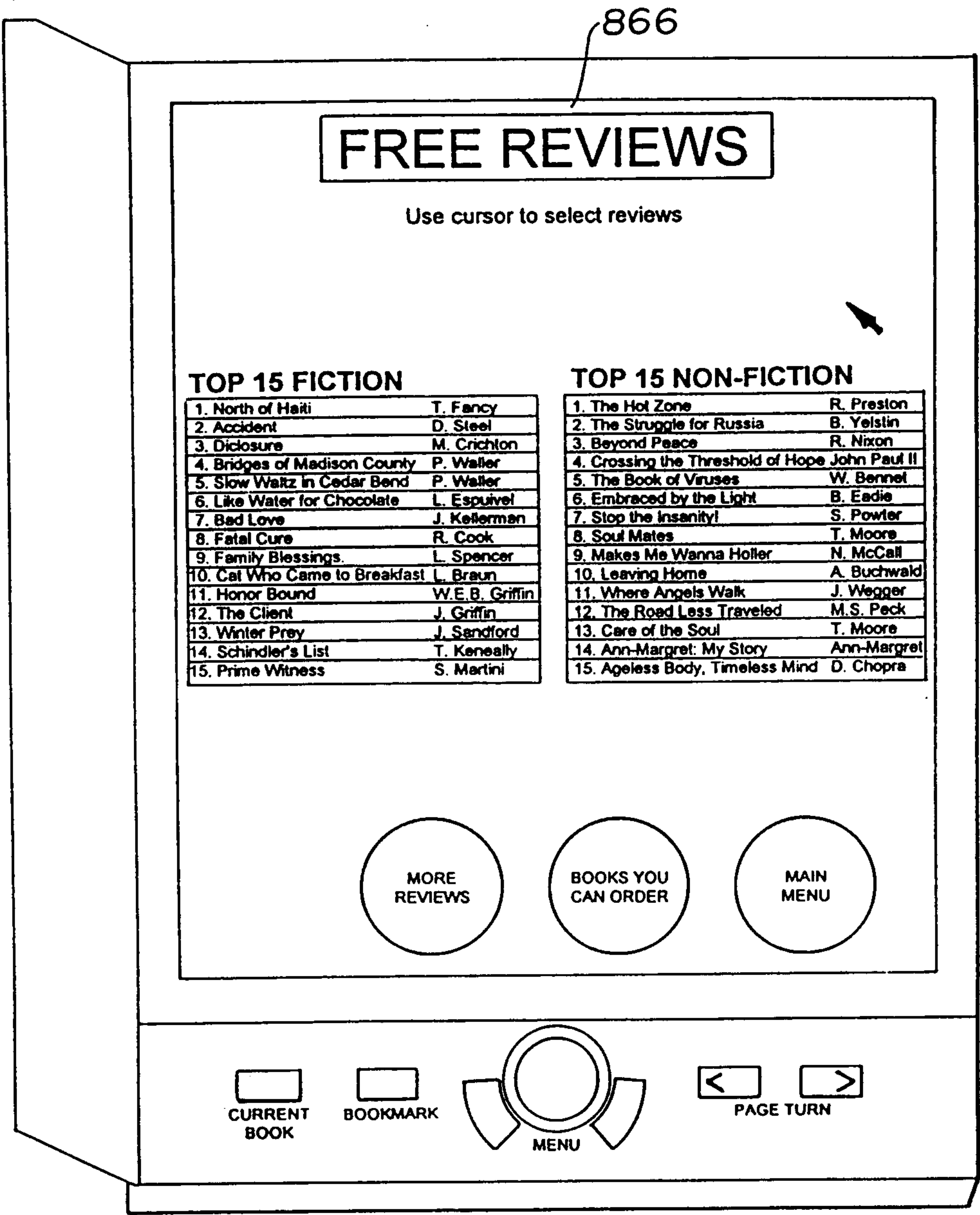
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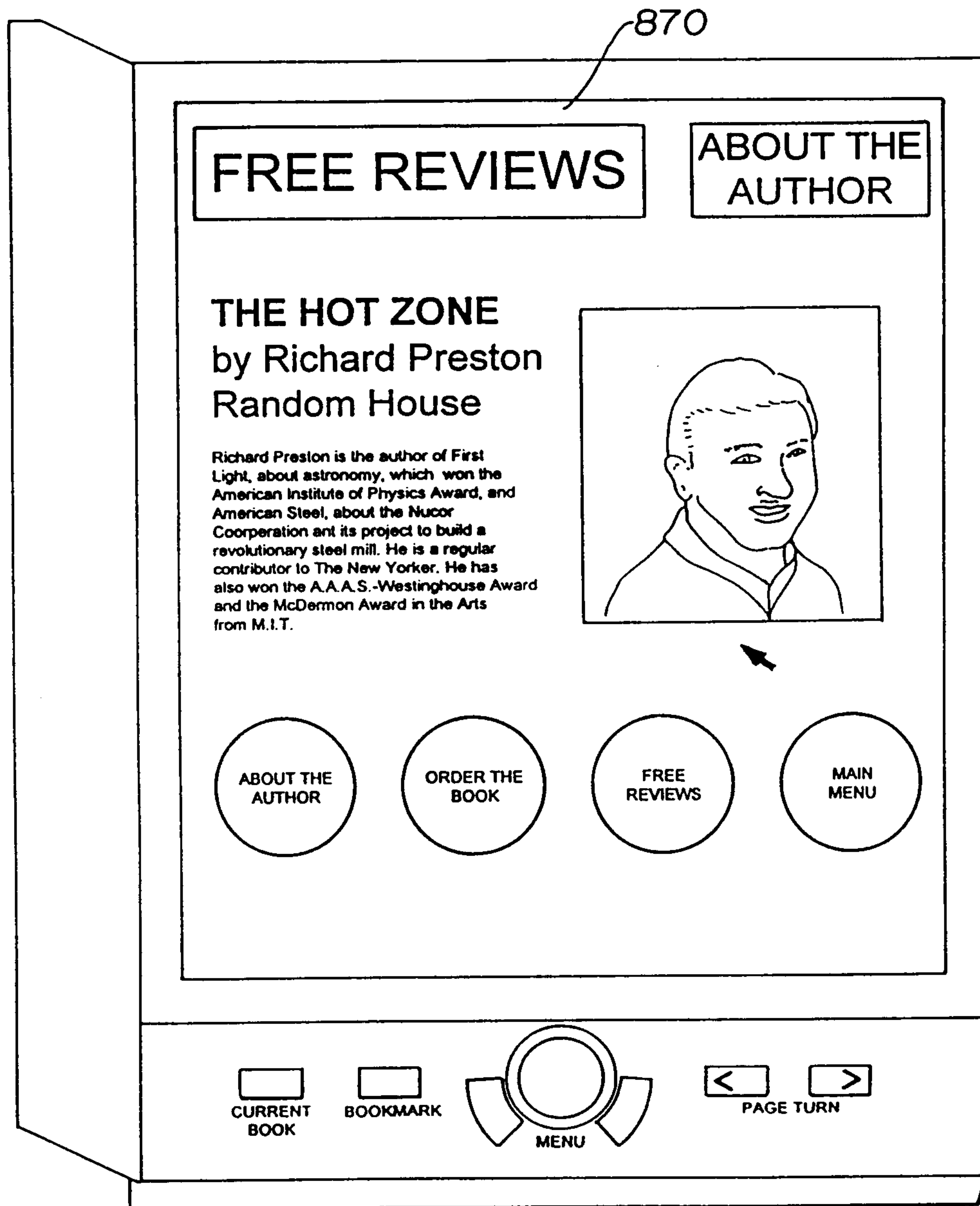
PAGE TURN

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Fig. 14i

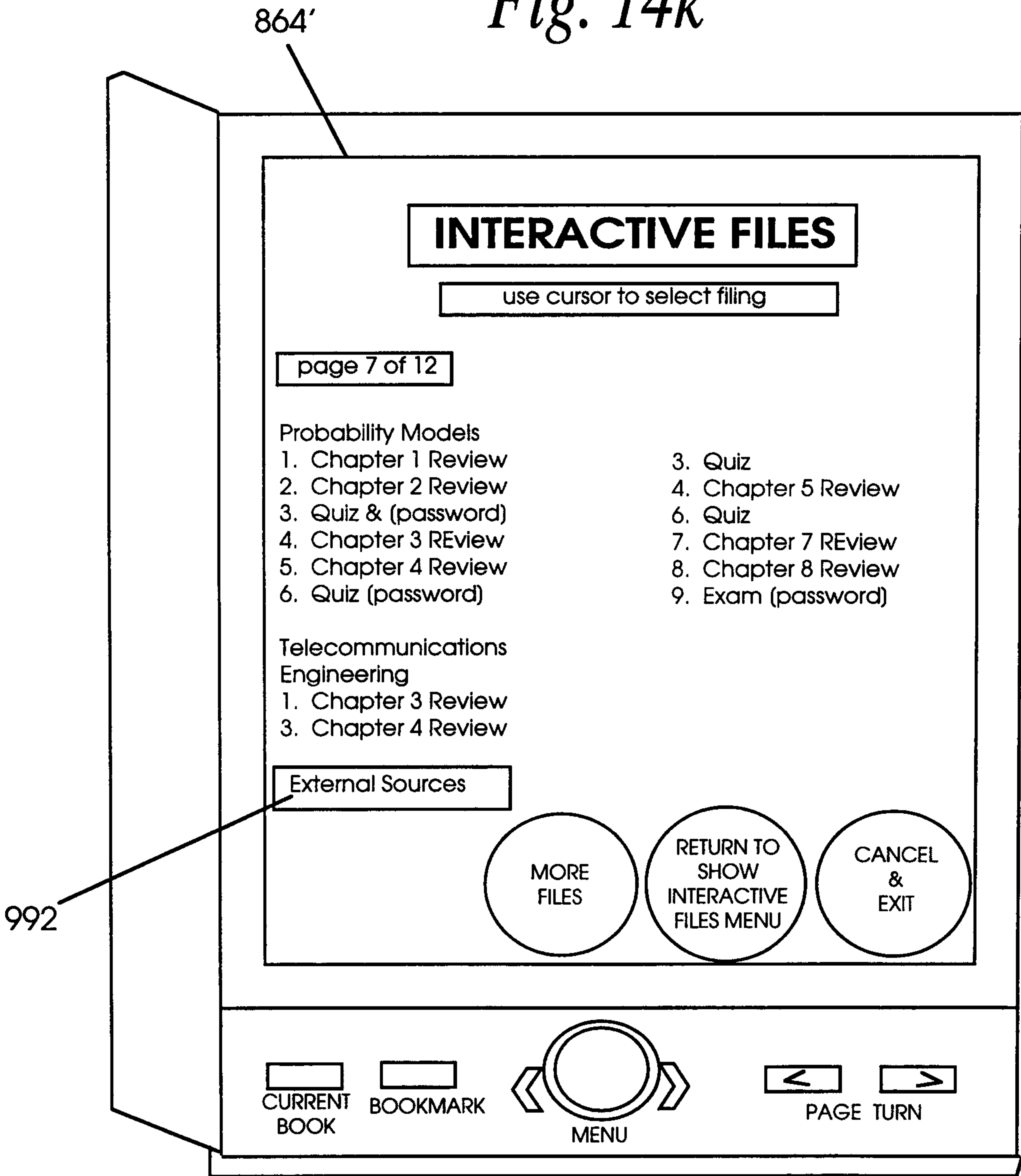


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Fig. 14j

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Fig. 14k



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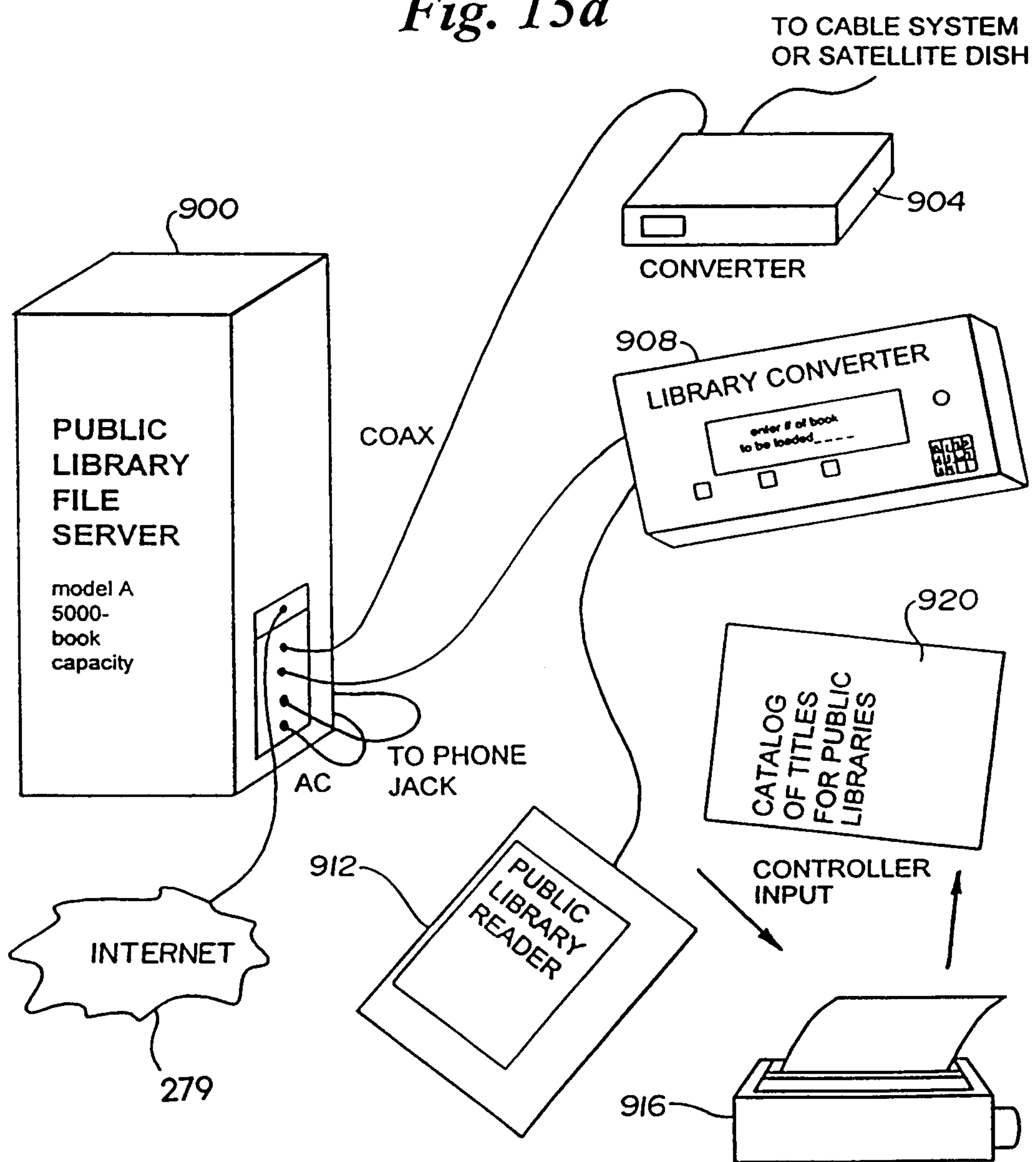
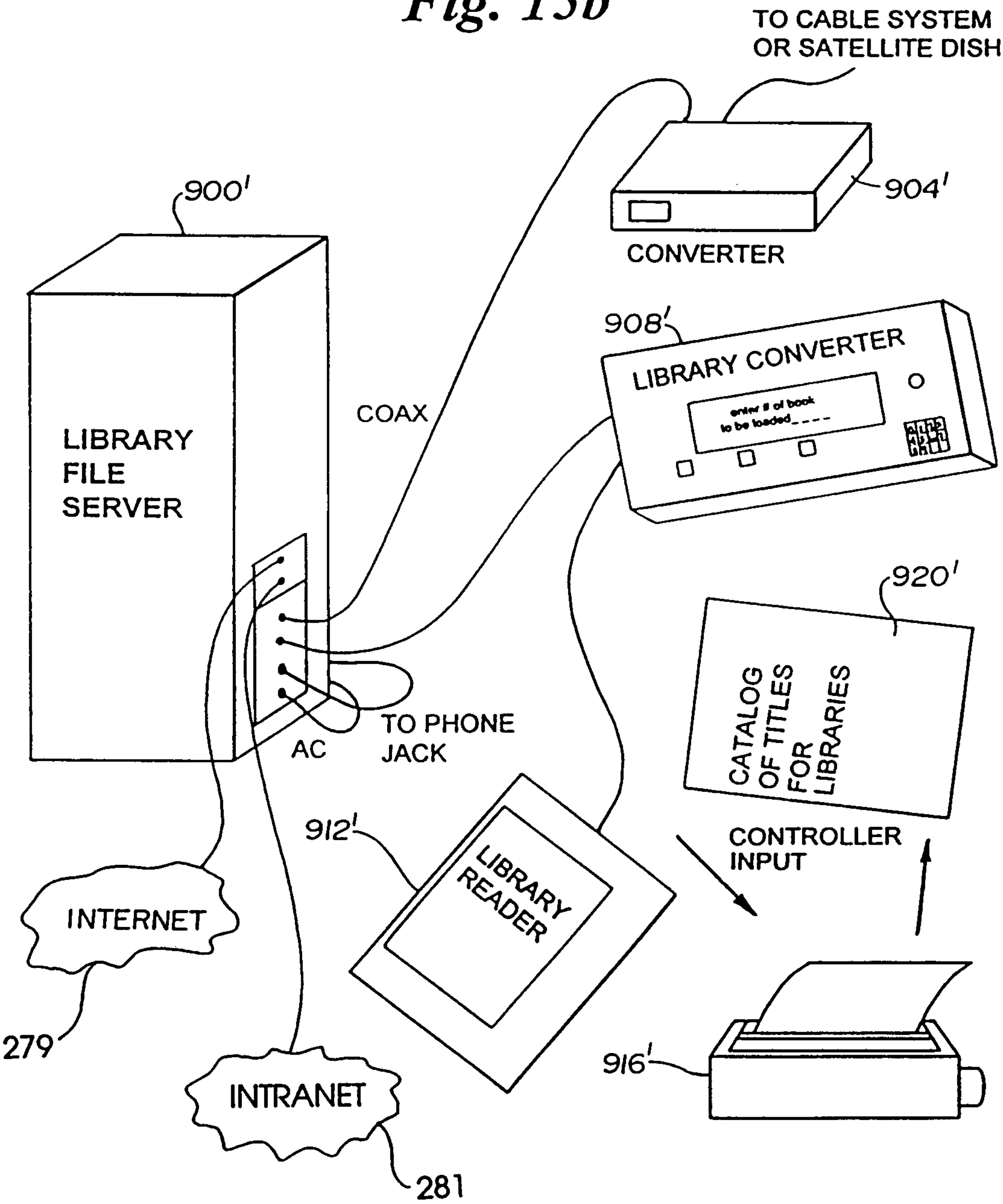
Fig. 15a

Fig. 15b



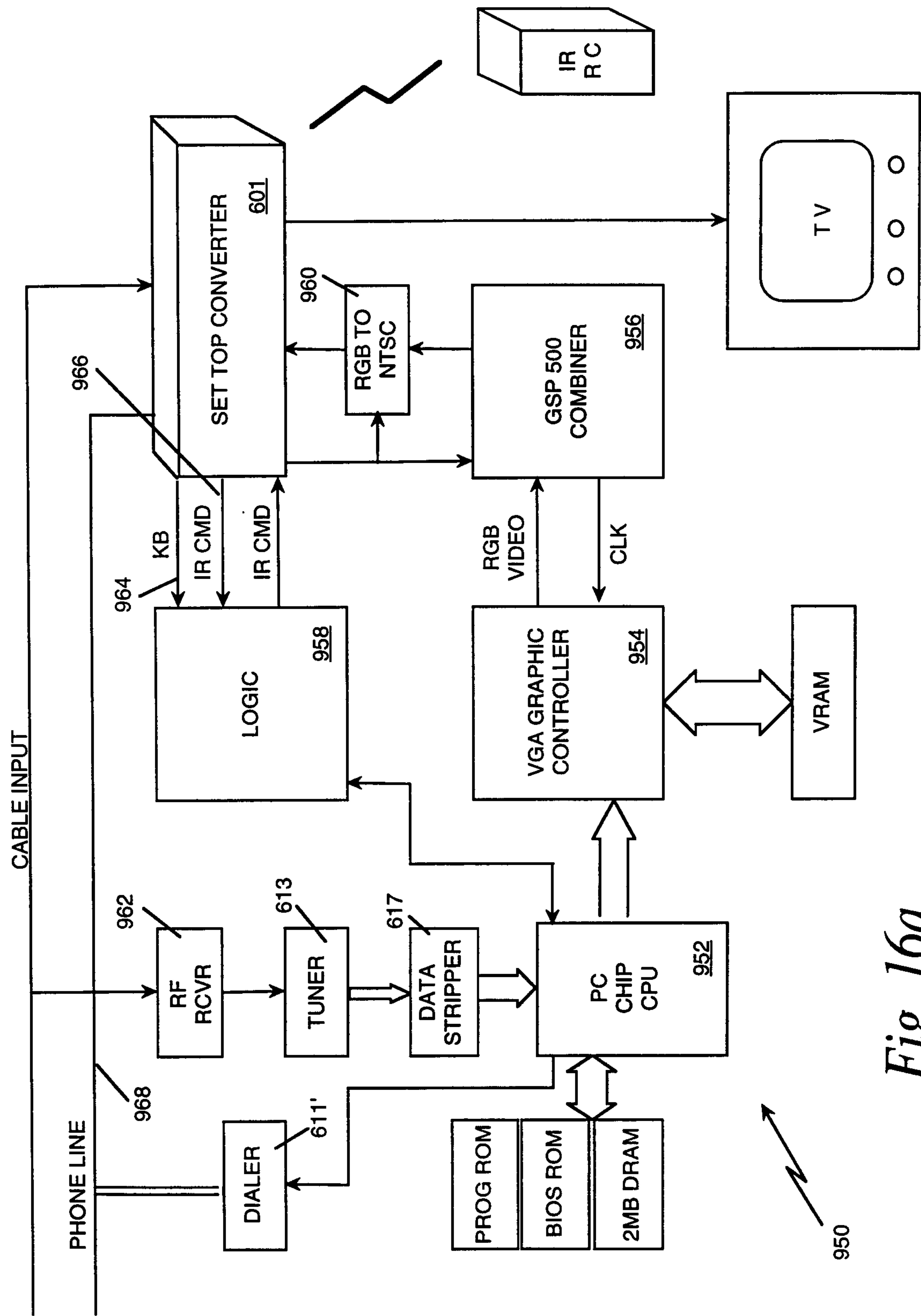


Fig. 16a

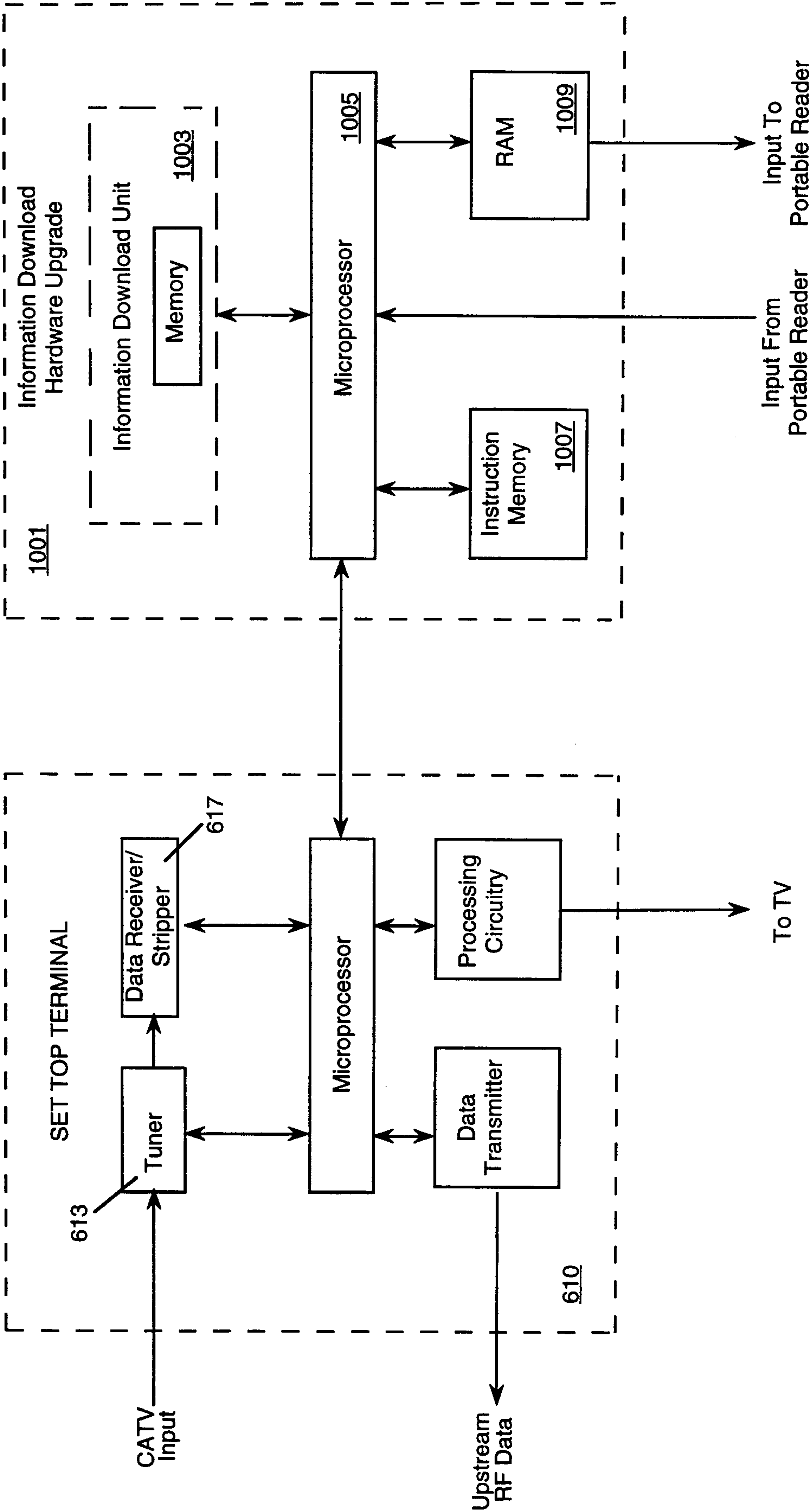


Fig. 16b

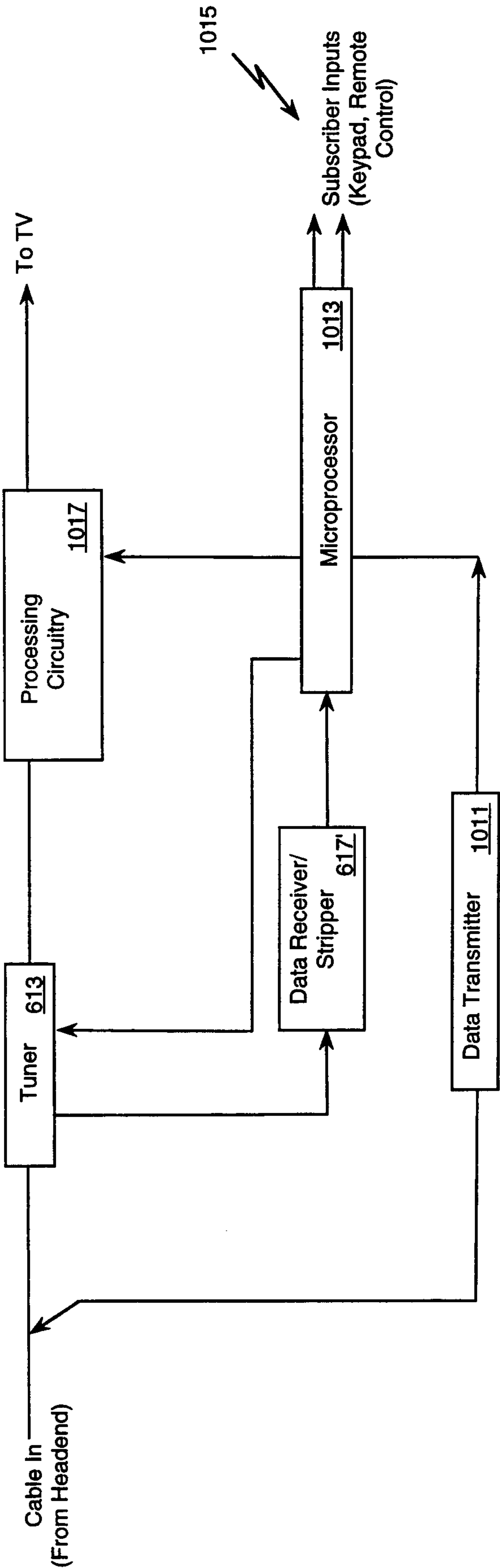
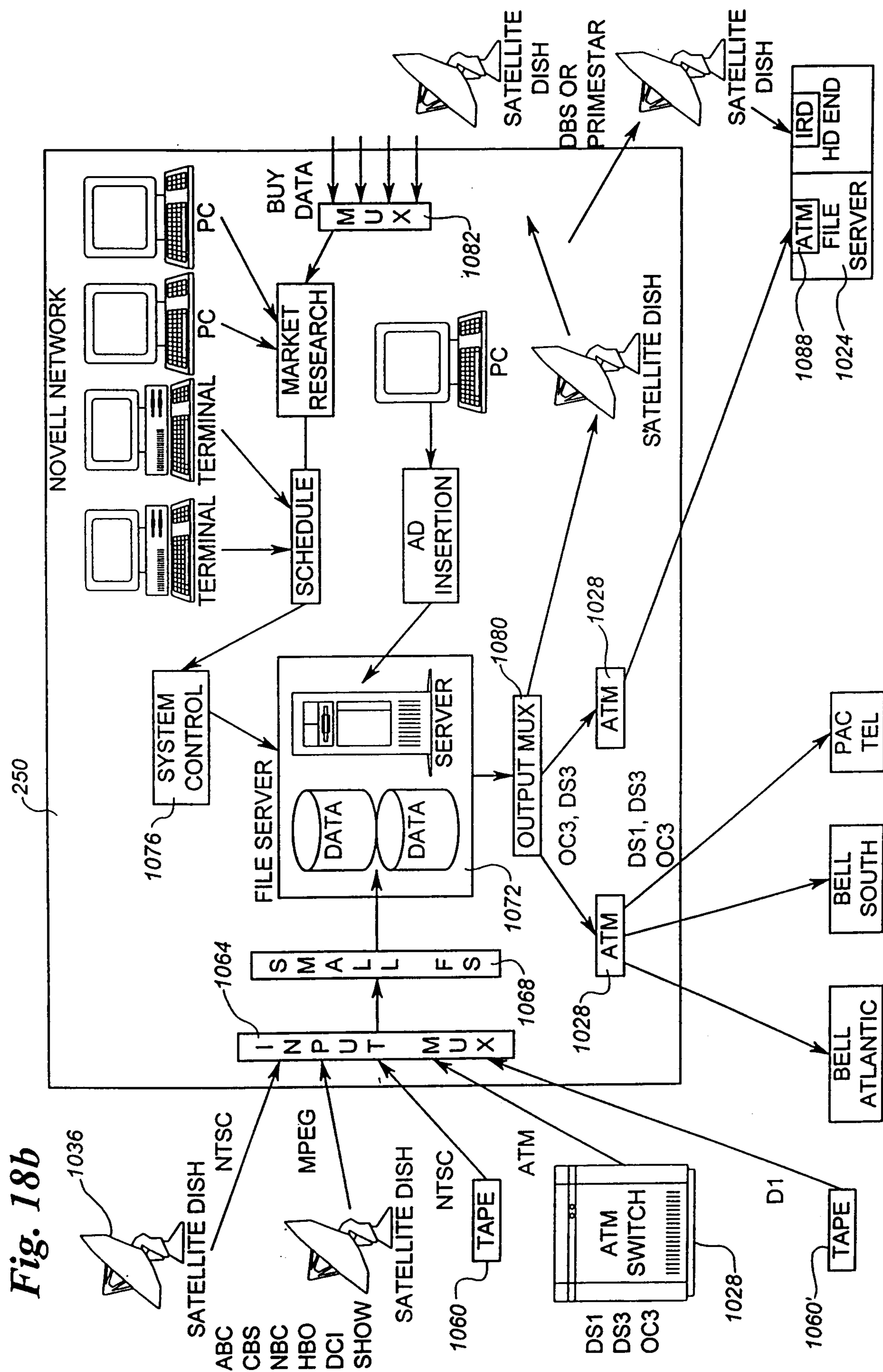


Fig. 17



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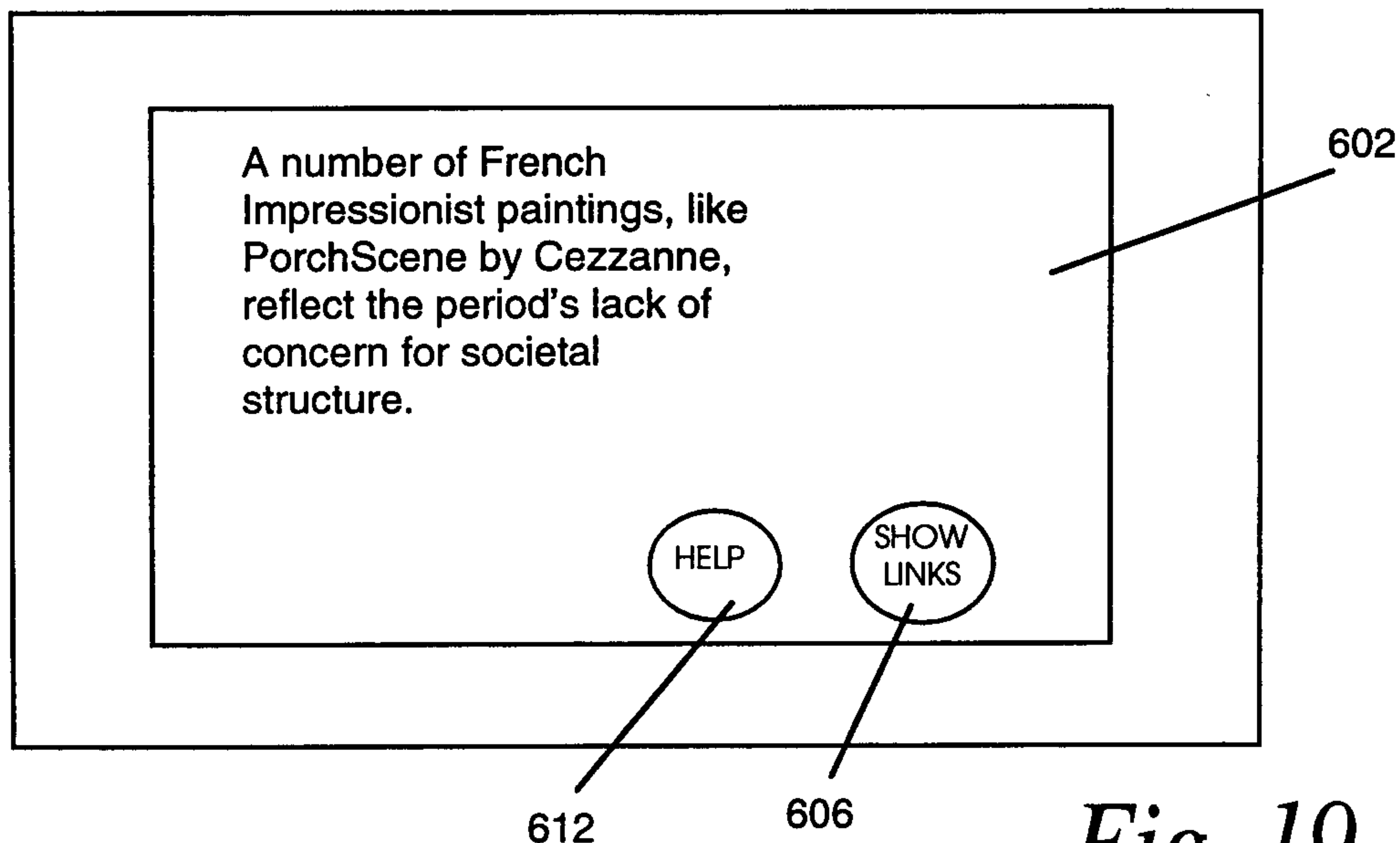


Fig. 19

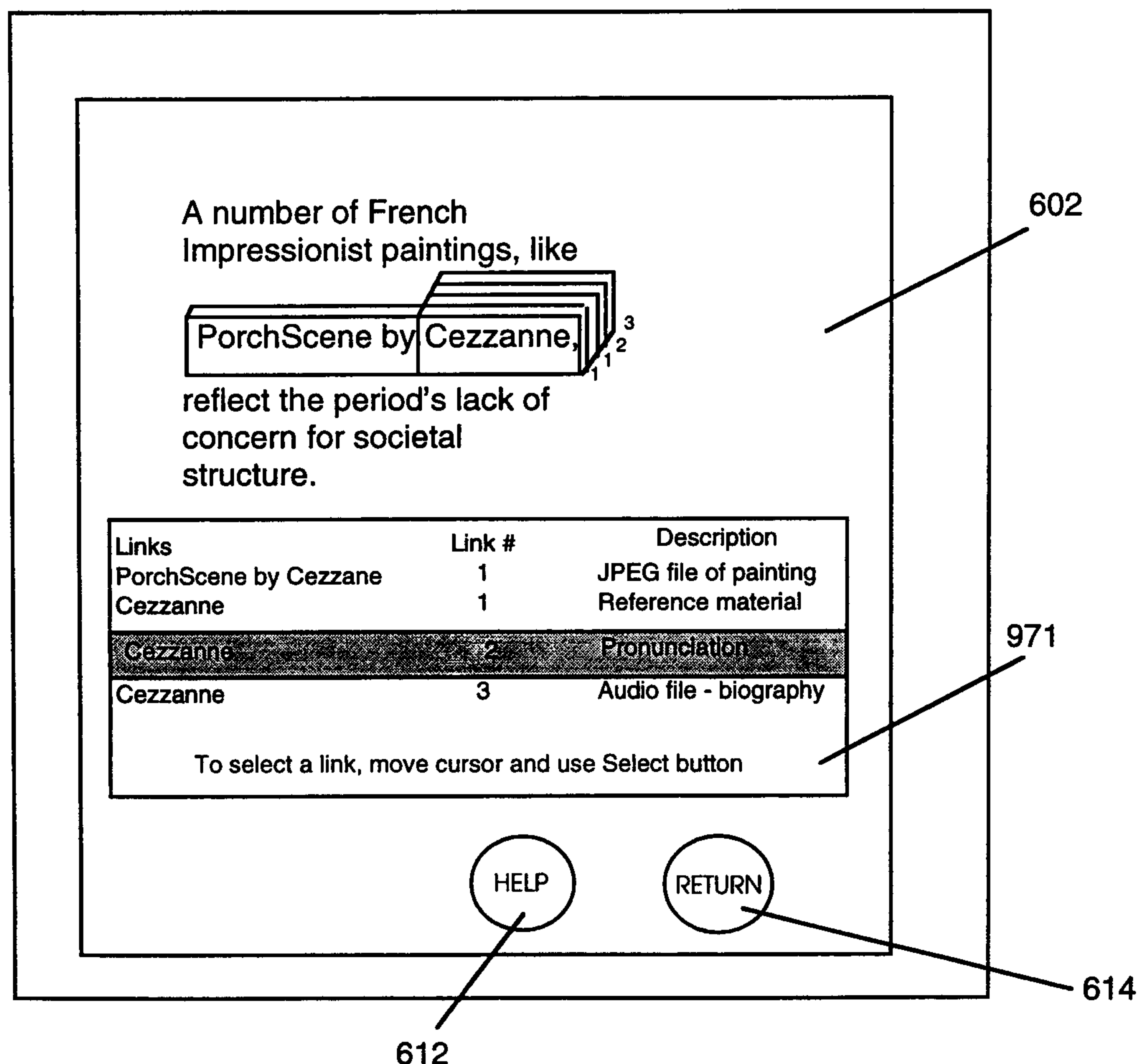
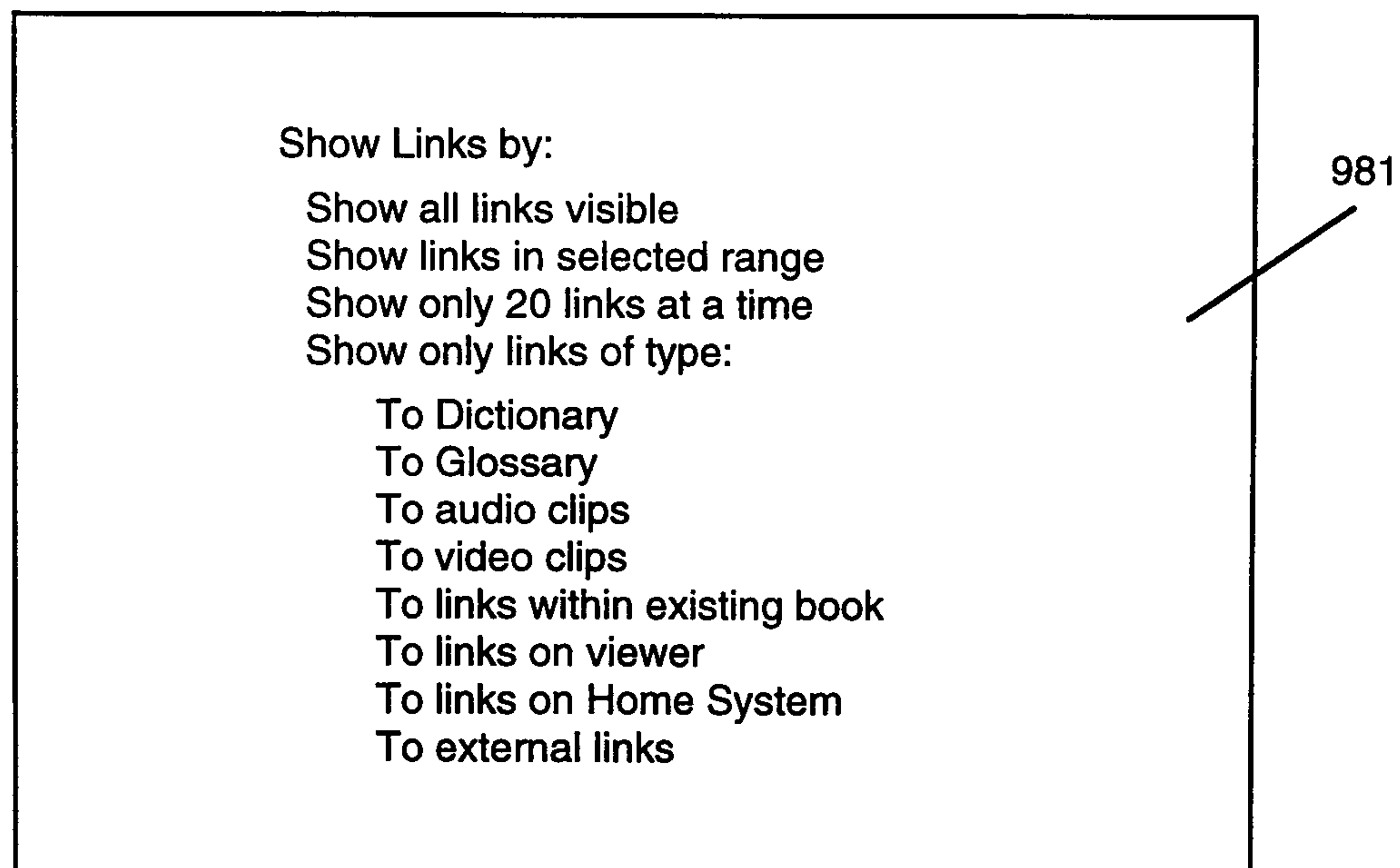
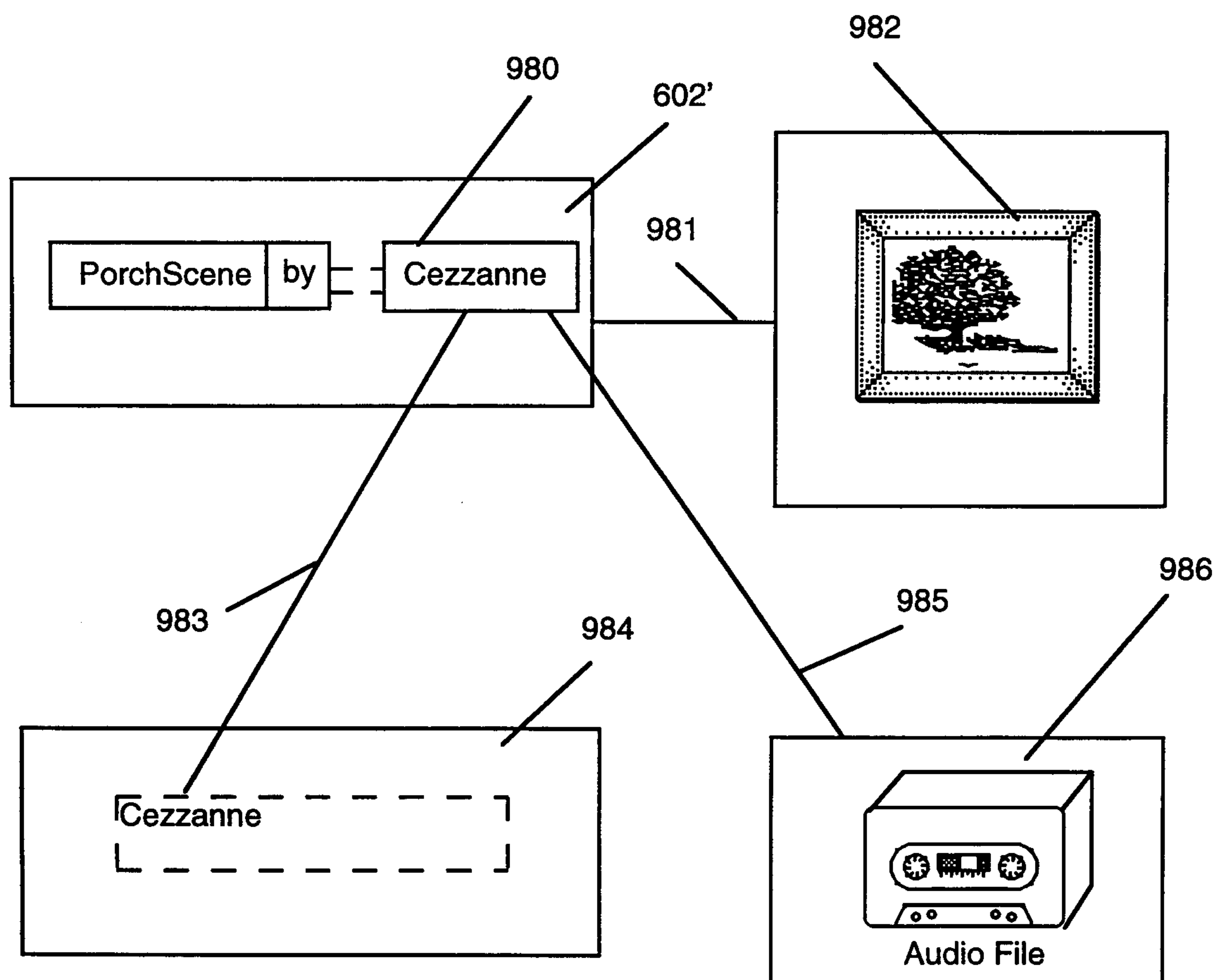


Fig. 20

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*Fig. 21*

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*Fig. 22*

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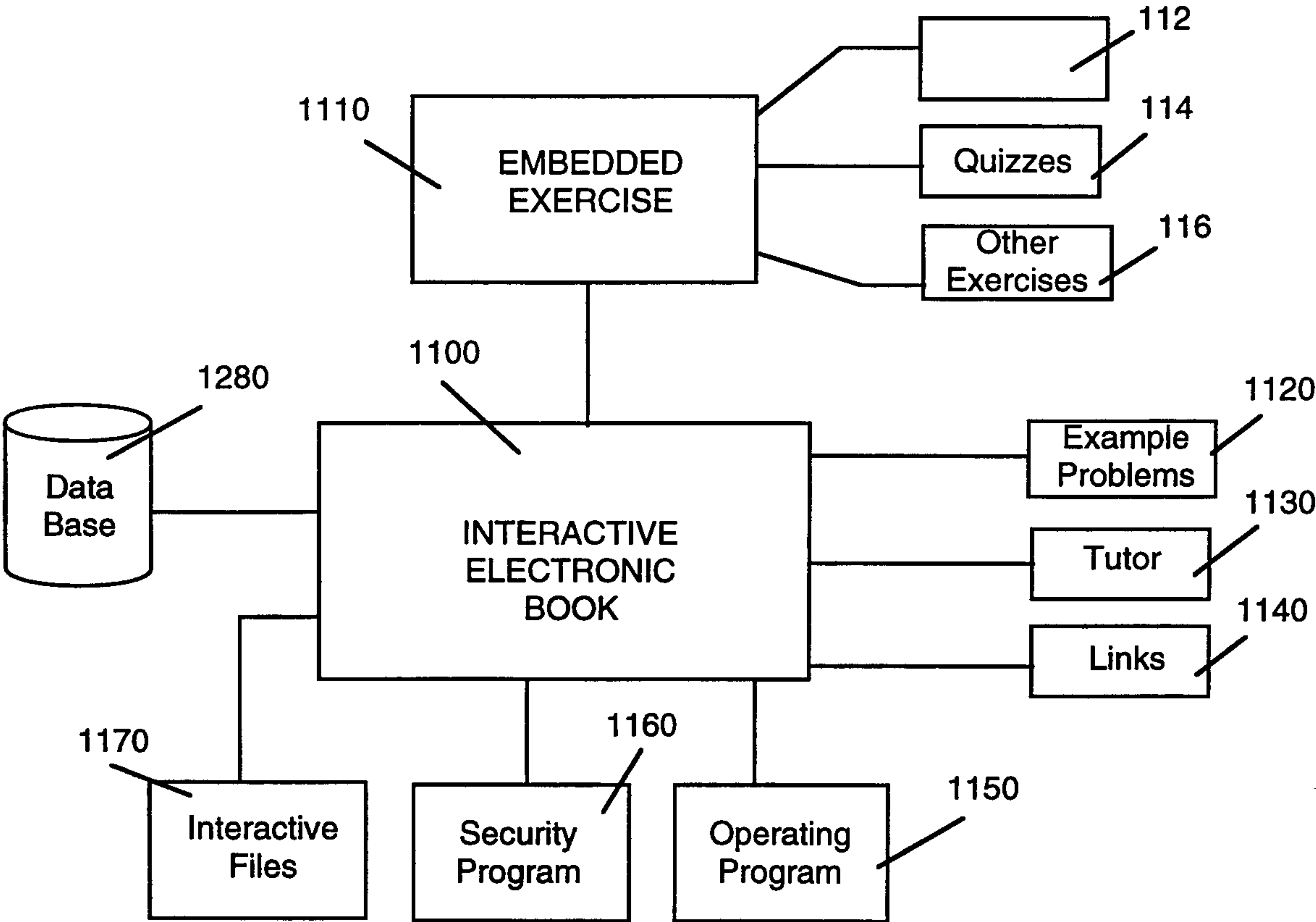


Fig. 23

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1210

Name: Student, Ima 1212

Password: 1214

Course: 1222

School: 1220

Date: 1216

Time Start: 1218

Time Remaining: 1219

1. Give the size, in octets, of the ATM cell. How much is header, and how much is payload? Why must we be careful when we specify this? 1242

1244

2. Describe at least two functions of the HEC in the ATM header.

1244

3. Describe how the cell delineation algorithm works. 1242

1244

4. What is the purpose of meta signaling in ATM? 1244

1244

1240

START 1261

END 1263

SEND 1262

INSTRUCTIONS 1264

HELP 1266

WARNING 1268

HONOR CODE 1270

Fig. 24

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1310

Name:

Password:

Course:

School:

Date:

Time Start:

Time Remaining:

1. An organization has N employees where N is a large number. Each employee has one of three possible job classifications and changes classification (independently) according to a Markov chain with transition probabilities.

1340

1342

.7	.2	.1
.2	.6	.2
.1	.4	.5

What percentage of employees are in each classification?

1344

2. Three white and three black balls are distributed in two urns in such a way that each contains three balls. We say that the system is in state i , $i = 0, 1, 2, 3$, if the first urn contains i white balls. At each step, we draw one white ball from each urn and place the ball drawn from the first urn into the second, and conversely with the ball from the second urn. Let X_n denote the state of the system after the n th step. Explain why $\{X_n, n=0, 1, 2, \dots\}$ is a Markov chain and calculate its transition probability matrix.

1342

1344

1360

START

END

SEND

INSTRUCTIONS

HELP

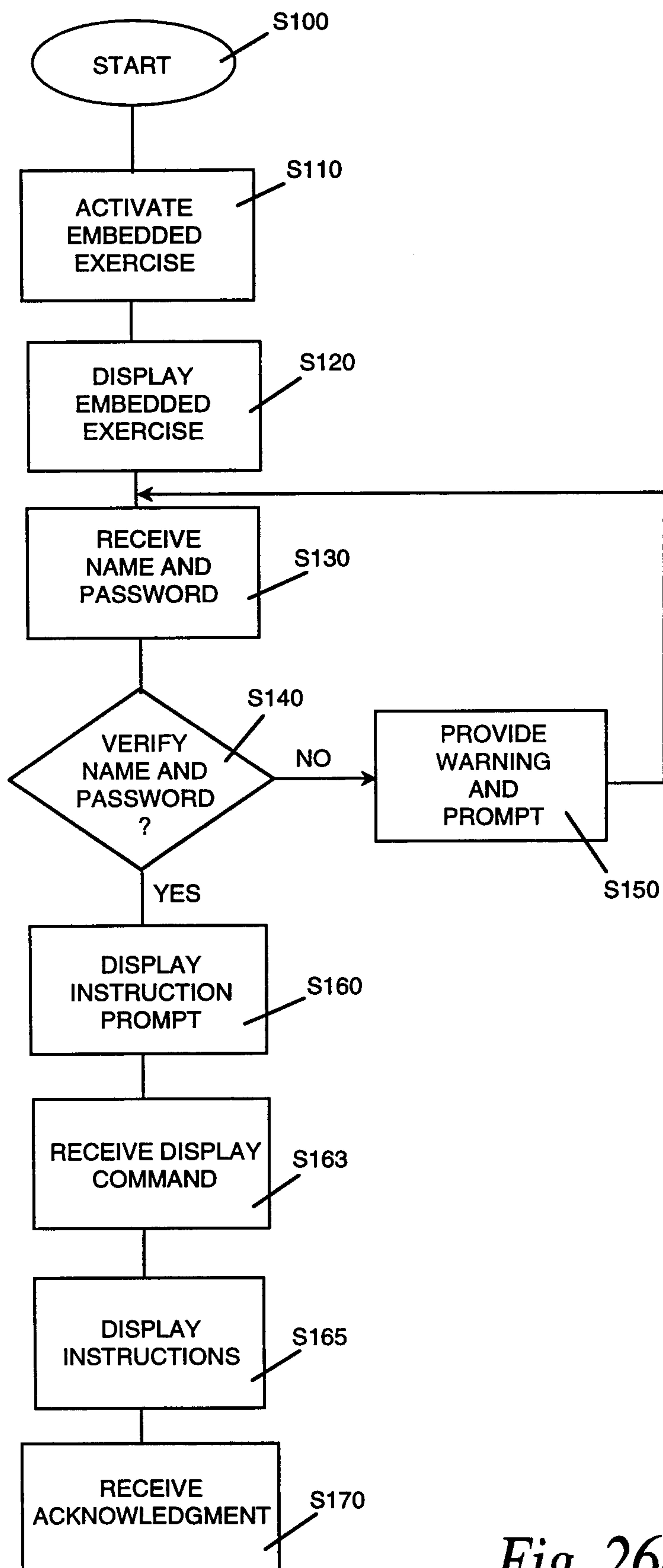
WARNING

HONOR CODE

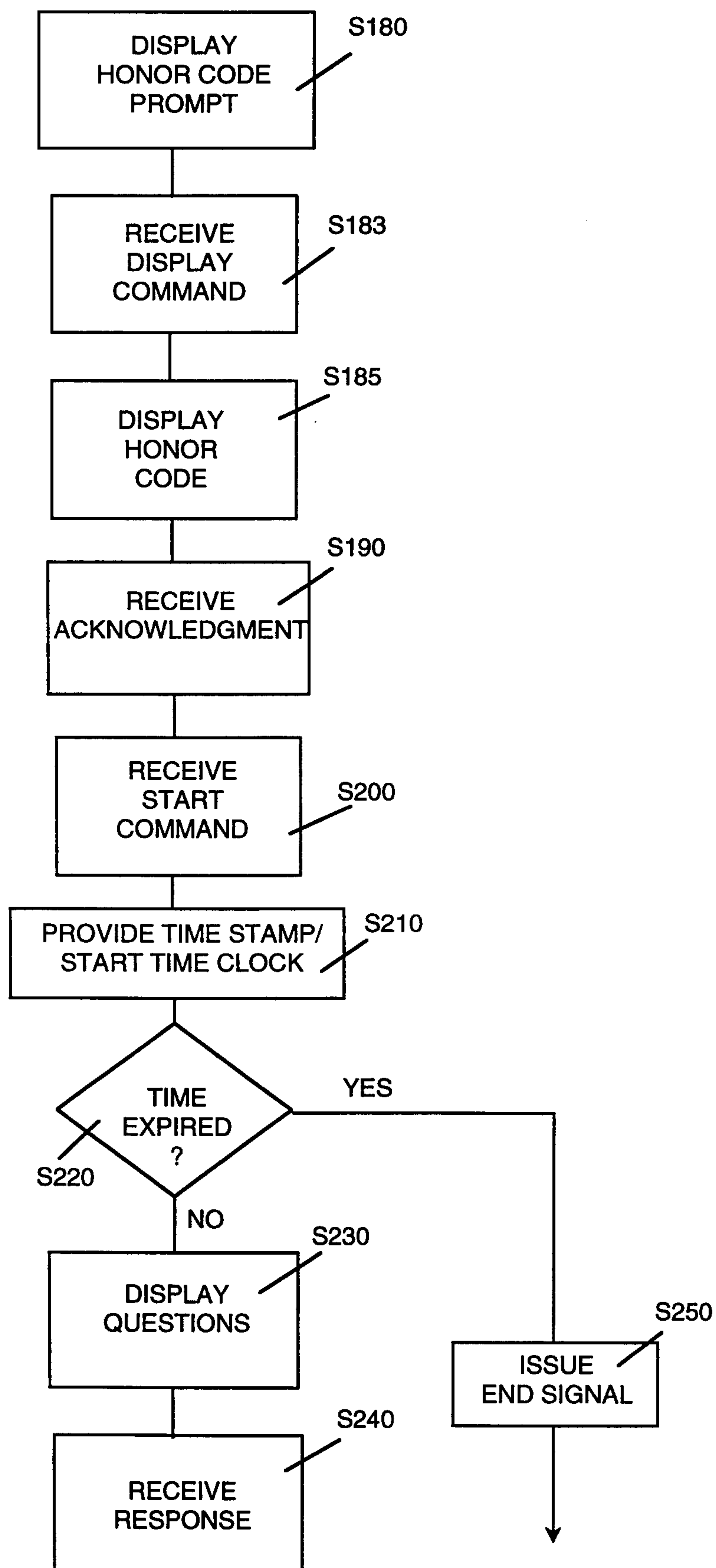
1300

Fig. 25

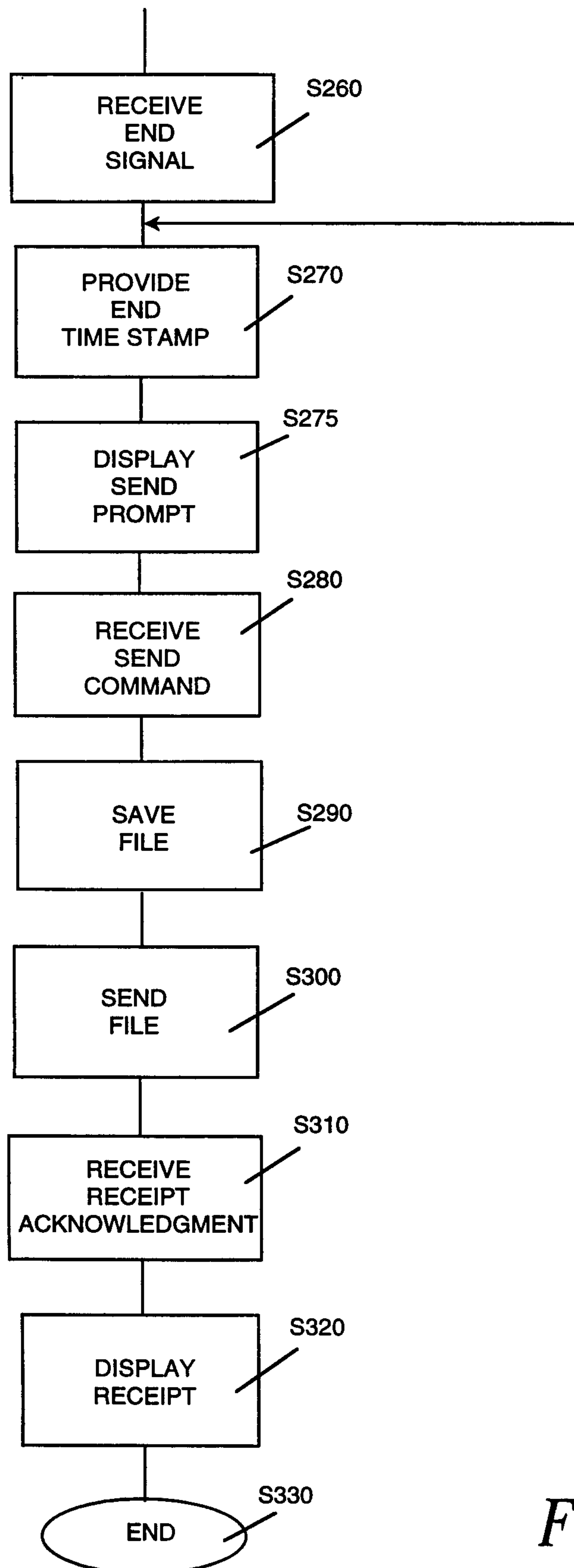
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*Fig. 26a*

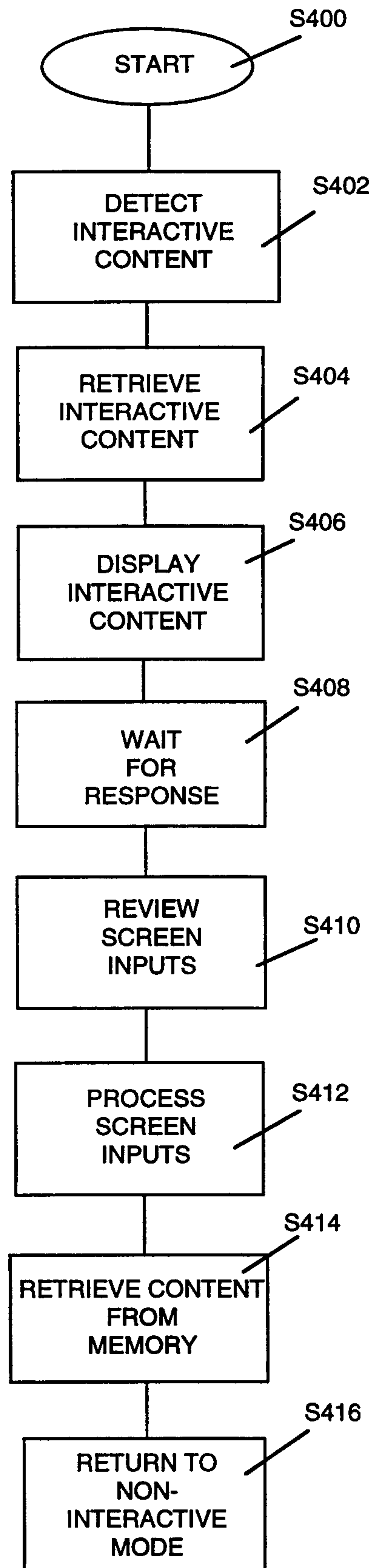
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*Fig. 26b*

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*Fig. 26c*

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*Fig. 27*

