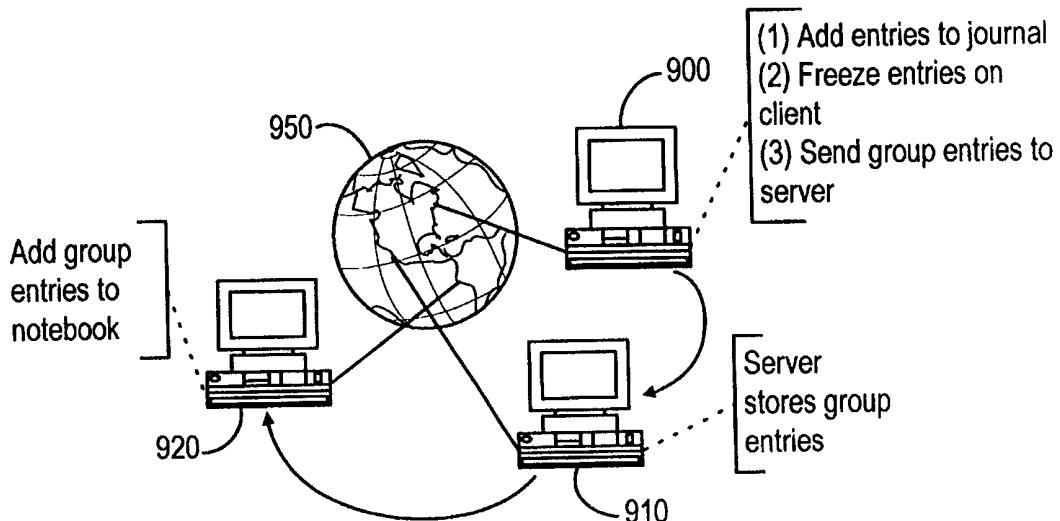




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(54) Title: ACCESSING, VIEWING AND MANIPULATION OF ARCHIVED INFORMATION



(57) Abstract

A method and apparatus are provided for accessing, viewing and manipulating data stored in a computer system (900). This is achieved by selecting one or more of the non-modifiable data objects (270) stored in a computer system (900), creating references to a reference list (240). The reference list is then manipulated (280) to allow a user to add to, remove from (250) or search (210) the references in the list. In some embodiments, different operations are performed by different computers (900, 910, 920) connected to a computer network (930) such as the Internet (950). In such cases, data objects are stored on a server computer (910) over the network (930). A reference list is stored on the client computers (900, 920) and can be directly manipulated by the user without a need for further interaction with the server computer (910).

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ACCESSION, VIEWING AND MANIPULATION OF ARCHIVED
INFORMATION

5 BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates generally to computer systems and, in particular, to accessing, viewing and manipulating archived information in a 10 computer system.

Related Art

Systems that allow users to store and retrieve information in a computer system, such as database 15 management systems, are well known. A database is a collection of data arranged according to a predefined structure. A telephone book is a classic example of a database containing a listing of telephone service subscribers, their respective telephone numbers and, 20 optionally, their addresses. The data stored in such a database is organized in a structure 100 having three fields: a subscriber name field 110, a subscriber telephone number field 120 and a subscriber address field 130, as shown in Fig. 1A. Records 150 are copies 25 of structure 100 that contain information specific to individual telephone subscribers. Multiple records 150 are stored in database 140, as shown in Fig. 1B.

Database management systems typically provide means for searching the database to retrieve a portion 30 of the records stored in the database that satisfy certain search parameters. These searches are generally referred to as queries. Using the telephone book database of Fig. 1B as an example, one could

subscriber has a certain address, or for all records in which the user has a certain name or, or for all records in which the user has a certain name and a certain address. Typically, however, database management systems do not allow users to manipulate the results of the queries, although some database management systems allow users to sort the order in which the records returned by a query are displayed. Other systems allow users to combine multiple search parameters in a single query; however, this approach still requires a new search to be performed.

Accordingly, there is a need for a computer information system that allows results of searches to be manipulated and stored for future use, without requiring a new search to be performed.

Furthermore, current global network information systems, such as the World Wide Web, allow user to retrieve information stored on different host computers connected to a global network (e.g., the Internet). The World Wide Web is described on pages 681-723 of "Computer Networks" by Andrew S. Tanenbaum (Englewood Cliffs, N.J.: Prentice-Hall, Inc. 3rd ed. 1996), which are herein incorporated by reference in their entirety. The information stored on the World Wide Web, for example, is organized in a plurality of web pages. Each web page contains information in different formats, including multimedia. In addition, each web page may contain "links" to other web pages. A user typically accesses the web pages through a web browser (i.e., a program executed by a computer connected to a global network that is able to retrieve and display data organized in web pages) by specifying an http address of a given web page. A user can then access other web pages either by specifying their http address

or by "following a link" (i.e., clicking a hypertext field on a web page currently displayed by the web browser). This process is generally referred to as "navigating" or "surfing" the World Wide Web.

5 Users, however, cannot generally modify web pages to discard irrelevant information. In addition, currently available web browsers do not provide facilities for easily storing and manipulating a collection of links without interrupting the current 10 search operation or performing a new search.

Typically, web browsers employ a search engine to search the World Wide Web for web pages that meet the parameters of the search. Search engines then generate one or more web pages containing links to the web pages 15 that meet the parameters of the search. The web browser, in turn, displays the web pages generated by the search. Thus, there is no easy way of manipulating the list of links contained in the web pages generated by the search engine. Accordingly, there is a need for 20 a more flexible and faster method of organizing, searching and manipulating data than is currently available.

SUMMARY OF THE INVENTION

25 The present invention provides a method and apparatus for accessing, viewing and manipulating data stored in a computer system. This is achieved by selecting one or more of the non-modifiable data objects stored in a computer system, creating 30 references to the selected data objects and adding the references to a reference list. The reference list is then manipulated to allow a user to add to, remove from or search the references in the reference list.

Furthermore, the invention provides a method and apparatus for accessing, viewing and manipulating data stored in a computer system in which different operations are performed by different computers

5 connected to a computer network. This is particularly advantageous for Internet related applications in which data objects are stored on a server computer and searched by client computers connected to the server computer over the Internet. A reference list is stored

10 on the client computers and can be directly manipulated by the user without a need for further interaction with the server computer.

BRIEF DESCRIPTION OF THE DRAWING

15 Fig. 1A illustrates the structure of a record of a prior art telephone book database.

Fig. 1B shows a prior art telephone book database having a plurality of records.

20 Fig. 2 is a flow diagram of a data manipulation operation, according to an embodiment of the invention.

Fig. 3 illustrates the relationships among a library, an archive and several notebooks, according to an embodiment of the invention.

25 Fig. 4A is a flow diagram of a notebook manipulation operation, according to an embodiment of the invention.

Fig. 4B is a flow diagram of a standalone library creation operation, according to an embodiment of the invention.

30 Fig. 4C is a flow diagram of a notebook manipulation operation, according to an embodiment of the invention.

Fig. 4D is a flow diagram of a notebook entry duplication operation, according to an embodiment of the invention.

Fig. 5A shows the menu structure of a software application program, according to an embodiment of the invention.

Figs. 5B-5D illustrate several views of a journal window of the software application program, according to an embodiment of the invention.

Fig. 6A illustrates a journal layout of a notebook window of a software application program, according to an embodiment of the present invention.

Fig. 6B illustrates a browser layout of a notebook window of a software application program, according to an embodiment of the present invention.

Fig. 7 illustrates a browser window of a software application program, according to an embodiment of the invention.

Fig. 8A illustrates a cockpit window of a software application program, according to an embodiment of the invention.

Fig. 8B illustrates a clue editing window of a software application program, according to an embodiment of the invention.

Fig. 8C illustrates a put window of a software application program, according to an embodiment of the invention.

Fig. 9A illustrates computers connected to a local area network, according to an embodiment of the invention.

Fig. 9B illustrates computers connected to a wide area network, according to an embodiment of the invention.

Fig. 9C illustrates computers connected to a global network, according to an embodiment of the invention.

Fig. 10A shows a window of a software application program that allows a user to access data entries stored in a standalone library.

Fig. 10B shows a window of a software application program that allows a user to access data entries stored in a standalone library over a global network.

Fig. 11 shows a window of a software application program that allows references to data entries to be accessed over a global network, according to an embodiment of the invention.

Figs. 12A illustrates the elements of a reference to a data object.

Fig. 12B illustrates specific values of the elements of a reference to a data object.

Fig. 12C illustrates the values of the elements of a reference to a data object in the special case of a data object that is not referenced in any notebook.

DETAILED DESCRIPTION OF THE INVENTION

A method and apparatus are provided for accessing, viewing and manipulating a wide variety of data objects stored in a computer system. Unlike in a database management system, data objects stored in the computer system can be searched or selected and the results of the search/selection can be freely manipulated. In addition, since the data objects are non-modifiable, the chronology of the data objects is preserved automatically and the task of maintaining references to the data objects is greatly simplified.

An operation 200 for selecting and manipulating non-modifiable data objects is described in Fig. 2.

The non-modifiable data objects are first created as modifiable data objects, edited and then converted into non-modifiable data objects. The modifiable data objects can be created using any suitable technique

5 known in the art including, but not limited to, importing data objects from an external file, generating data objects in a word processing, graphics or paint program or "copying and pasting" data objects from another application program via a "copy and paste"

10 facility provided by an operating system. As those skilled in the art are familiar with these techniques, they are not further discussed herein. First, stage 210 determines whether a search is being performed on a set of non-modifiable data objects stored on the

15 computer system, in which case operation 200 proceeds to parameter search stage 220. Otherwise the operation proceeds to stage 260. Each non-modifiable data object has content data, a unique identifier and meta-information used in the search. The content data can

20 be text, image, video, audio, multimedia or any combination thereof. For example, in some embodiments, the non-modifiable data objects are implemented in HTML. In parameter search stage 220, the search parameters are specified by a user of the computer

25 system, although those skilled in the art realize that the search parameters could also be supplied by an application program executed by the computer system. For instance, the search parameters may include the author of the source data object, a range of creation

30 dates of the data objects, specific text data contained in the data objects, whether the data object is already referenced in some other list of references to data objects, etc. Stage 230 determines if any data objects

satisfy the search parameters, in which case a reference to each of the matching data objects is created in stage 240. Otherwise operation 200 terminates. Stage 260 determines whether data objects 5 are being selected, in which case operation 200 proceeds to stage 270. Otherwise, operation 200 terminates. In stage 270, one or more references to data objects are selected by a user and operation 200 proceeds to stage 280. Stage 280 then determines 10 whether any of the reference are to be manipulated, in which case operation 200 proceeds to stage 250. Otherwise operation 200 terminates. Any references to the matching data objects are manipulated in stage 250. For example, a list of references to the matching data 15 objects is displayed in a window of a software application program executed by the computer system. A user may then add or delete references from the list, perform a new search on the references contained in the list or sort the references in a particular order. 20 Individual data objects, as well as information about the data objects, can be displayed in the same window as the list of references either by scrolling through the references or by clicking on a particular reference in the reference list, as shown in Figs. 6A, 6B and 7. 25 A computer system according to an embodiment of the invention is illustrated in Fig. 3. In Fig. 3, a library 300 includes a journal 310, archives 320 and notebooks 330, 340 and 350. Journal 310, in turn, has a plurality of journal entries 350, 360, 370 and 380. 30 Journal entries 350, 360, 370 and 380 are data objects, according to an embodiment of the invention. The body of a journal entry can be created by any suitable technique known in the art. For example, text journal entries can be created by a word processing program

executed by the computer system, image data entries can be created by a drawing program executed by the computer system, etc. Alternatively, journal entries can be created by inputting them directly into the 5 computer system. For example, a text entry can be created by typing into a text pane of the computer system. An image data entry can be created by copying the image into a window pane of the computer system using the "cut and paste" function of an operating 10 system such as the MACOS operating system.

Journal entries are typically fluid, in the sense that they can be modified at any time (e.g., by a user of the computer system). While journal entries are in a fluid state, they can only be accessed through the 15 journal. Thus, adding entries to a journal is similar to a user having his/her own private electronic diary. Journal entries can be made available to other components of the system by storing them into archives 320. This process is referred to herein as "freezing" 20 a journal entry. Once a journal entry is stored in archives 320, it becomes "frozen" and can no longer be modified. Thus, journal entries 360, 370, 380 and 390 are stored in archives 320 as frozen entries 365, 375, 385 and 395, respectively.

25 Furthermore, references to frozen entries 365, 375, 385 and 395 can be combined in notebooks 330, 340 and 350. These references are referred to as notebook entries. Thus, as used herein, a notebook is simply a collection of references to frozen entries stored in 30 archives 320. Only one reference to an entry is allowed in each notebook, even though two separate notebooks can each contain references to the same entry. In Fig. 2, for instance, notebook A 330 contains references to frozen entries 365 and 375,

notebook B 340 contains references to frozen entries 365, 385 and 395, and notebook C 350 contains references to frozen entries 385 and 395.

Figs. 4A-4C are flow diagrams of operations 5 performed on the system of Fig. 3. Fig. 4A describes data object manipulation operation 400, according to an embodiment of the invention. Journal entries 360, 370, 380 and 390 (Fig. 3) are first created in stage 405 and then stored in archives 320 as frozen entries 365, 375, 10 385 and 395, in stage 408. Frozen entries 365, 375, 385 and 395 are then selected by a user for inclusion in a notebook (e.g., notebook A 330), in stage 410. In stage 415, a reference to the selected entries is created and added to the notebook. Finally, references 15 are added to and/or removed from the notebook by a user, in stage 420.

Fig. 4B describes a standalone library creation operation 430, according to a further embodiment of the invention. Stages 435, 437, 440, 445 and 447 are 20 analogous to stages 405, 408, 410, 415 and 420 of the operation of Fig. 4A. In stage 450, however, one or more notebooks are selected by the user for publication and, in stage 455, the selected notebooks and the corresponding entries in archives 320 are "published" 25 by replicating the notebooks and the entries and storing the resulting copies as a non-modifiable collection of data objects and associated references in the computer system. The published library is referred to as a standalone library and the notebook entries 30 contained in the standalone library cannot be modified. Furthermore, the standalone library does not provide a journal for adding entries to the archives. New entries cannot be added to the notebooks of the

standalone library and existing notebooks cannot be modified.

Fig. 4C describes a data object manipulation operation 460, according to a further embodiment of the invention. Stage 465 is analogous to stage 405 in Fig. 4A. In stage 470, however, the frozen entries are searched according to a set of search parameters. Stage 475 then determines whether any of the frozen entries satisfies the search parameters, in which case 10 the operation proceeds to stage 480. Otherwise, the operation proceeds to stage 485. In stage 480, references to the frozen entries satisfying the search parameters are created and, combined with the entries already stored in the notebook (e.g., if a reference to 15 the frozen entry does not already appear in the notebook, a new notebook entry is added referencing the frozen entry). Finally, in stage 485, notebook entries are added to or removed from the notebook by a user.

Fig. 4D illustrates a notebook entry duplication operation 490, according to an embodiment of the invention. In Fig. 4D, stage 487 first determines whether a search is being conducted, in which case 20 operation 490 proceeds to stage 493. Otherwise, stage 489 determines whether a selection is being performed, 25 in which case operation 490 proceeds to stage 491. Otherwise operation 490 terminates. The source notebook entries are searched in stage 493. Stage 495 then determines if any source notebook entries satisfy 30 the search parameters, in which case operation 490 proceeds to stage 497. Otherwise operation 490 terminates. In stage 491, one or more source notebook entries are selected to be duplicated in one or more destination notebooks. Finally, in stage 497, the 35 source notebook entries either selected in stage 491 or

returned by a search in stage 493 are combined with the destination notebook entries (e.g., if a reference to the same data object is not already contained in the destination notebook, a new reference to the data 5 object is created and added to the destination notebook) and operation 490 terminates.

A software application program in accordance to an embodiment of the invention and executed by a general purpose computer running under the MACOS operating 10 system is now described in reference to Figs. 5A-5E, 6A-6B and 7-8.

Fig. 5A illustrates the menu structure of the software application program. In Fig. 5A, menubar 505 has several pulldown menus: file menu 515, edit menu 15 525, text menu 535, manage menu 545 and notebook menu 547, in addition to the standard Apple menu common to most MACOS application programs. Each of the menus of menubar 505 provides access to one or more commands that can be performed by the software application 20 program. For instance, file menu 515 contains commands to create, open, close and save a library, importing a file or a notebook, exporting a notebook (e.g., saving the frozen entries referenced by the notebook into a 25 file) and printing the data objects referenced by a notebook on a printer connected to the computer system. In addition, file menu 515 provides access to standard MACOS operations to close the current active window, performing page setup for a document to be printed or quitting the current application program. Similarly, 30 edit menu 525 provides access to standard formatting and editing commands supported by MACOS. Text menu 535 provides access to commands that determine the appearance of text characters displayed by the software application program. Manage menu 545, in turn,

provides access to several commands to create a new entry or a new browser window (Fig. 7), open the cockpit window (Fig. 8A) or display a clues window (Fig. 8B). Finally, notebook menu 547 provides access 5 to commands to create, open, delete or rename a notebook, as well as to sort notebook entries.

Figs. 5B-5D illustrate a journal window 500 of the software program displayed on a screen of a monitor of the computer system. Journal window 500 includes a 10 window header 510 and one or more entry panes 520. Window header 510 includes a command menu 530 and a sort menu 550. Command menu 530 controls commands to be performed on the entire journal, such as removing entries from the journal ("zap") and replicating 15 entries in one or more notebooks ("put" and "zip"). Zip and put are both used to replicate entries in one or more notebooks, however, put requires that the destination notebooks be explicitly specified by the user. By contrast, zip provides a facility ("sifting") 20 that allows users to automatically replicate notebook entries in a predetermined set of notebooks if a number of keywords ("clues") associated with the set of notebooks are found in the entries being zipped. For example, a user can create a clue such as "project x" 25 to distribute all entries regarding project x to all notebooks concerning project x. During a zip operation, entries are sifted for the term "project x" and those entries containing "project x" are automatically replicated in all notebooks specified in 30 the project x clue. Sort menu 550, in turn, controls the order in which the entry panes 520 are displayed in journal window 500. Entry panes 520 may scroll up or down to display more entry panes 520 than can physically be displayed in journal window 500 at any

one time. As those skilled in the art are familiar with scrolling window techniques, they are not further discussed herein.

Each entry pane 520 includes a format menu 555, a 5 entry command menu 560, a title text field 565, a tag text field 570, a source text label 575, a creation time label 580, a comment field pane 585 and a body pane 590. Title text field 565, tag text field 570, source text label 575, creation time label 580, and 10 comment pane 585 are all searchable and siftable and are thus referred to as meta-information. Format menu 555 controls the display format of entry pane 520. Entry command menu 560 controls commands performed on the entry displayed in entry pane 520. Title text 15 field 565 contains a user modifiable title identifying the entry. Typically, the title is assigned by the user creating the entry. Tag text field 570 contains a user modifiable tag field used to further identify the entry. Tag text field 570 is the only field that can 20 still be modified after the entry is frozen (e.g., in a notebook entry). Source text label 575 is a non-modifiable text label identifying the source of the entry. Likewise, creation time label 580 is a text label indicating the creation time of the entry. 25 Comments pane 585, on the other hand, is a free form text field that allows the user creating the entry to describe the contents of body text pane 590. Finally, body pane 590 is a free form text field that is used to store the body of the entry. In some embodiments of 30 the invention, body pane 590 is used to store data other than text. For example, in some embodiments body text pane 590 stores text data, image data, video data, audio data or any combination thereof.

All entries displayed in an entry pane 520 of journal window 500 are initially fluid. A fluid entry is an entry that can be modified by the user and is, therefore, private to the journal (the entry cannot be 5 referenced outside the journal, e.g., by a notebook). A fluid entry that is stored in archives 320 becomes a frozen entry. Once an entry is frozen it can no longer be modified by the user, even though it may still appear in journal window 500. A journal entry can be 10 removed from journal window 500 by issuing a "zap" command. The zap command can be issued from entry command menu 560 of entry pane 520, from command menu 530 of journal widow 500 or from command menu 805 of cockpit window 800.

15 Figs. 6A-6B illustrate a notebook window 600. Notebook window 600 (Fig. 6A) comprises a window header 610 and one or more entry panes 620A, 620B, etc., one for each entry of the notebook displayed in notebook window 600. Window header 610 includes a command menu 20 630, a total label 635, a layout menu 640 and a sort menu 650. Command menu 630 controls commands to be performed on the entire notebook, such as removing entries from the notebook or replicating the entry into other notebooks. Layout menu 640 controls the 25 arrangement of entry panes 620A, 620B, etc. in notebook window 600. By selecting one of the layouts specified in layout menu 640 the user can cause notebook window to appear in either journal layout (Fig. 6A) or browser layout (Fig. 6B). Sort menu 650 controls the order in 30 which entry panes 620A, 620B, etc. are displayed in notebook window 600. Entry panes 620A, 620B, etc. may scroll up or down within notebook window 600 in Fig. 6A. As those skilled in the art are familiar with

scrolling window techniques, they are not further discussed herein.

Each entry pane 620A, 620B, etc. includes a command menu 660, a notebook menu 645, a title label 665, a tag field 670, a format menu 635, a source label 675, a creation time label 680, a freezing time label 683, a comment pane 685 and a body pane 690. Command menu 660 controls commands performed on the entry displayed in entry panes 620A, 620B, etc. When notebook menu 645 is activated, a list of notebooks containing the notebook entry displayed in entry pane 620A is displayed. The user can then display one of these notebooks by simply selecting the notebook name from notebook menu 645. Title label 665 identifies the entry displayed in entry pane 620A. Tag field 670 contains a user modifiable tag used to identify the entry displayed in entry pane 620A during searches and sorts. Format menu 635 controls which format entry panes 620A, 620B, etc. are displayed in. Note that each of entry panes 620A, 620B, 620C, 620D and 620E appears in a different format selected via format menu 635. Source label 675 is a non-modifiable text label identifying the source of the entry displayed in entry pane 620A. Likewise, creation time label 680 is a text label indicating when the entry displayed in entry pane 620A was created as a journal entry and freezing time label 683 is a text label indicating when the entry displayed in entry pane 620A was frozen. Comments pane 685, on the other hand, is a text field used to describe the contents of body pane 690. Finally, body pane 690 is a free form text field used to store the body of the entry displayed in entry pane 620A. In some embodiments of the invention, body pane 690 is used to store data other than text. For example, in

some embodiments body pane 690 stores text data, image data, video data, audio data or any combination thereof.

When notebook window 600 appears in browser layout 5 (Fig. 6B), a notebook entry list pane 695 is displayed between window header 610 and entry pane 620A. The user can then select any entry in notebook entry pane 695 for display in entry pane 620A by double clicking on the corresponding line of notebook entry list pane 10 695.

Note that since notebooks, unlike journals, contain only frozen entries title label 665, comments pane 685 and body pane 690 of entry pane 620A cannot be modified by the user. By contrast, title field 565, 15 comments pane 585 and body pane 590 of entry pane 590 of Fig. 5B can be modified since the entry displayed in entry pane 590 is fluid. On the other hand, tag field 670 can still be modified even though the underlying data object is frozen. As a result, the user can enter 20 any text in tag field 670 to aid in future searches or sorts of the notebook entries.

Notebook entries can be exported as text files. For example when an export menu command of command menu 660 is selected, the entry shown in entry pane 620A is 25 stored as a text file in a location specified by the user. Those skilled in the art realize that a similar scheme can be devised to allow notebook entries to be imported from text files arranged in a predefined format. For example, text files could be imported as 30 the body of a notebook entry. Alternatively, meta-information could be extracted from formatted data at a predefined location within the file.

Fig. 7 illustrates a browser window 700 that can be used to display notebook entries. Browser window

700 is similar to notebook window 600 in browser mode, except for the addition of a notebook list pane 710 and the elimination of layout menu 640. The user can thus access individual notebooks by double clicking on a 5 corresponding line of notebook list pane 710.

Users of the application program can also manipulate notebooks by means of cockpit window 800, shown in Fig. 8. Cockpit window 800 includes a command menu 805, a source pane 810, a destination pane 820 and 10 a filter pane 830. Filter pane 830, in turn, includes a time box 850, condition boxes 860 and 870 and a notebook list pane 840.

Command menu 805 controls the commands performed on the entries stored in library 300 (Fig. 3). Source 15 pane 810 can be used to select specific notebooks for the command specified by command menu 805. Destination pane 820 specifies which notebooks the selected entries should be replicated to, if required by the command selected from command menu 805. Notebooks can be added 20 to source pane 810 and destination pane 820 by dragging selected list items from notebook list pane 840 to source pane 810 or destination pane 820 or by pushing an "add" button. Notebooks can be removed from source pane 810 and destination pane 820 by selecting a 25 corresponding line of the scrolling lists displayed in source pane 810 and destination pane 820 and pushing the corresponding "delete" button.

Finally, filter pane 830 allows the user to specify parameters to be used to limit the number of 30 entries selected via source pane 810 that are to be transferred to the notebooks specified via destination pane 820, again, if required by the command selected from command menu 805. The operation specified via command menu 805 is triggered by pushing command button

880, whose appearance is modified to reflect the type of command selected via command menu 805.

To speed up searches, in some embodiments, the contents of frozen entries are indexed upon freezing.

5 This is accomplished by creating an alphabetical list of the words contained in an entry being frozen and comparing the list to a master list of words contained in the entries already frozen in the library. The master list, in turn, contains separate lists for each
10 word of references to frozen entries containing that word. When a word in the list for the entry being frozen is already contained in the master list, a reference to the entry is added to the reference list for that word in the master list. Otherwise, if the
15 word is not already included in the master list, the word is added to the master list and a new reference list for that word is created having a reference to the entry being frozen. Those skilled in the art realize that other techniques for indexing entries can be used
20 in place of the one described above. The invention is not limited to any particular indexing scheme and other indexing schemes other than the one described herein can be used in accordance to the principles of the present invention. Since once entries are frozen they
25 can no longer be modified, there is no need to re-index the entries every time an entry is modified. As a result, the overhead associated with indexing the entries is minimized, while still allowing for fast searching of the frozen entries stored in a library.

30 Fig. 8B illustrates a clues editing window 890 that is displayed in response to a user selecting the clues command from manage menu 545 (Fig. 5A). Clue editing window 890 allows the user to add, delete or edit clues. Clues allow the user to associate one or

more notebooks with a specific name or acronym (the "clue"). When the clue is used either in the header or in the body of a journal or notebook entry and a zip command is issued, the entry is sifted and

5 automatically added to the notebooks associated with the clue. The zip command is analogous to the put command, except that destination notebooks are not explicitly defined by means of put window 895 (Fig. 8C), but are determined according to the clues

10 contained within the entry. Thus, the user can use the zip command to distribute entries to notebooks associated with certain topics specified by the clues without having to explicitly select the notebooks.

Furthermore, repetitive tasks like zipping and

15 zapping all journal entries at the end of the day can be automated by using a feature of the application program known as "chores." Chores allow a user to specify a certain operation to be performed at fixed intervals of time by the application program without

20 requiring further user interaction. The user, of course, can cancel a chore when it is no longer needed.

Fig. 8C illustrates put window 895 that is displayed when the put command is selected from command menu 805, or when a put command is selected using the

25 command menu of a notebook or journal entry. Put window 895 allows the user to specify which notebooks the selected entries are to be distributed to. For the user's convenience, a notebook list pane 897 is provided which contains a listing of all available

30 notebooks. Notebooks can be added or deleted from selected notebook list 899 by pushing add button 892 or delete button 893. The put command is triggered by pushing put button 896.

According to one embodiment of the invention, journal entries are created on a first client computer connected to a network, selected journal entries are added to the archive on the first computer, stored in the archives of a group library stored on a server computer connected to the network, and forwarded to the archives of a second client computer also connected to the network. Figs. 9A-9C illustrate these operations when the computers are connected to a local area network, a wide area network and a global area network, respectively.

In Fig. 9A, general purpose computers 900, 910 and 920 are connected to a local area network 930 and execute an information system program according to an embodiment of the invention, such as the one described in reference to Fig. 3. Local area network 930 is any suitable local area data communications network known in the art. A user of general purpose computer 900 creates journal entries, as described in reference to Figs. 5B-5D. The user then freezes the entries by storing them in the archives of general purpose computer 900, as described in reference to Fig. 3. Copies of all entries selected for distribution by the user are then transferred over local area network 930 to general purpose computer 920, where they are stored in the archives of the group library. A user of general purpose computer 930 then receives copies of the frozen entries stored in the group library of general purpose computer 920, storing them in his/her library.

In some embodiments, a general purpose computer is designated as a central repository for entries published by all users connected to the network and then distributes copies to the archives of individual

computers while in others the central repository can be located on one of the individual computers. Other techniques for data distribution and broadcasting known in the art may be used according to the principles of 5 the invention. As those skilled in the art are familiar with these techniques, they are not further discussed herein.

In Fig. 9B, general purpose computers 900, 910 and 920 are connected to a wide area network 940 and 10 execute an information system program, according to an embodiment of the invention, such as the one described in reference to Fig. 3. Wide area network 940 is any suitable wide area data communications network known in the art. Entries are created and distributed over wide 15 area network 940 in a manner analogous to the one described with reference to general purpose computers 900, 910 and 920 of Fig. 9A.

In Fig. 9C, general purpose computers 900, 910 and 920 are connected to a global network 970 and execute 20 an information system program, according to an embodiment of the invention, such as the one described in reference to Fig. 3. Global network 970 is any suitable wide area data communications network known in the art. Entries are created and distributed over 25 global network 970 in a manner analogous to the one described with reference to general purpose computers 900, 910 and 920 of Fig. 9A.

Fig. 10A shows a window 1000 of a software application program that allows a user to access a 30 standalone library.

Window 1000 has a browser header 1010, an entry list pane 1020, an entry pane 1030, an author notebook list 1040 and a reader notebook list 1050. Browser header 1010, entry list pane 1020, entry pane 1030

perform the same functions as the corresponding elements of browser window 700 (Fig. 7). Author notebook list 1040, on the other hand, provides access to notebooks created by the author of the standalone library prior to the publication of the standalone library. Reader notebook list 1050, provides access to notebooks created by the user after the publication of the standalone library. As a result, notebooks accessed through author notebook list 1040 cannot be modified by the user, while notebooks accessed through reader notebook list 1050 can be modified by the user.

Fig. 10B shows window 1000 displayed within a pane of web-browser window 1060. Web-browser window 1060 is a window of a web-browser application program such as NETSCAPE NAVIGATOR, available from Netscape Communications Corp. of Mountain View, Calif., or INTERNET EXPLORER, available from Microsoft Corp. of Redmond, Wash., that allows users to access and view web-pages over the Internet. Window 1000 is displayed within a pane of web-browser window 1060 by means of a plug-in extension to the web-browser application program that allows standalone libraries to be accessed and viewed over the Internet by accessing a URL of a computer on which the standalone library is residing.

Fig. 11 shows window 1060 of a software application program that allows a user to access libraries stored on one or more server computers connected to a client computer via the Internet, as shown in Fig. 9C.

Pane 1100 has a browser header 1110, an entry list pane 1120, an entry pane 1130, an author notebook list 1140 and a reader notebook list 1150 that perform analogous functions to those of browser header 1010, entry list pane 1020, entry pane 1030, author notebook

list 1040 and reader notebook list 1050 of Figs. 10A-10B. However, library list 1160 allows a user of the software application program to select a particular standalone library or hyper-library among a list of 5 libraries stored on server computers connected to the client computer via the Internet. A hyper-library is similar to a standalone library, except that the author can always add new entries and notebooks to the hyper-library. A user of the application program of Fig. 11 10 can thus access any library stored on a computer connected to the Internet, regardless of whether the library is a standalone library or a hyper-library. Furthermore, references to data objects in separate 15 libraries stored on server computers can be combined in a single notebook by a user of client computer connected to the server computers via the Internet. These notebooks comprise a local library that is 20 private to the user (e.g., the USER library of Fig. 11). The entries contained in a library stored on a server can be viewed by first selecting the library 25 from library list 1160 and then clicking on a line of entry list 1120. The contents of the corresponding entry are thus displayed in entry pane 1130. The user can also search the entries in one or more libraries by using cockpit window 800 (Fig. 8A), create reader's 30 notebooks and add/remove entries from the reader's notebooks. Author's notebooks, on the other hand, cannot be modified by the user. The application program of Fig. 11 can thus function as a search engine for data objects stored on computers connected to the Internet. The results of the search comprise a listing 35 of references 1200A to data objects that include a library ID 1210A, a notebook ID 1220A and an entry ID

1230A, as shown in Fig. 12A. Fig. 12B shows the values of library ID 1210B, notebook ID 1220B and entry ID 1230B of reference 1200B for the notebook entry selected in Fig. 11. As shown in Fig. 12C, when a 5 frozen entry in a library is not referenced in any notebook, notebook ID 1220C has a special value, such as -0- to indicate that the frozen entry is not referenced in any notebook.

An example is now provided of the operation of the 10 various application programs described above. In the example, the application program of Figs. 5A-8C is referred to as Personal Archive Librarian (PAL), the application program of Figs. 9A-9B is referred to Group Archive Librarian (GAL), the application program of 15 Figs. 10A-10B is referred to as Standalone Archive Librarian (SAL) and the application program of Fig. 11 is referred to as Hyper Archive Librarian (HAL).

In the example, a three-person team is working on 20 a project, but each teammember is located in a different office. Each teammember has a computer equipped with PAL, GAL, SAL and HAL. The computers are connected via the Internet. A Central Project Library (CPL) is created on a server computer equipped with GAL. The CPL has a unique library ID 1210. Each 25 teammember is registered as a user of the CPL by providing GAL with the library ID of the teammember's PAL library. A list of clues, agreed upon by the teammembers, is maintained on each teammembers' PAL together with a Project Notebook (PN). Each teammember 30 periodically zips his/her journal entries. Entries containing any of the clues for the project are automatically added to the PN. Alternatively, a chore can be set up to automatically zip new entries at fixed time intervals. Once a day, GAL then sends a message

to the PALs of each teammember registered as a user of the CPL requesting that all new notebook entries in the PNs be sent to GAL. The entries are thus imported into the CPL. GAL then exports to each teammember's 5 PAL all new entries that were not created by that teammember. The entries are then imported into each teammember's PAL journal. At the end of this operation each teammember has a copy of all notebook entries pertaining to the project that are stored in the CPL, 10 regardless of the author.

At some point, one of the teammembers is asked to teach a class on a new technology developed by the project. The teammember then searches the CPL for all entries related to the new technology and saves them in 15 several notebooks dealing with different aspects of the new technology. When the teammember is satisfied that all the relevant entries have been included in the notebooks, he/she exports the notebooks and the corresponding entries into a standalone library (SL) 20 about the new technology. During the course, each of the teammember's students has a computer equipped with SAL and a copy of the SL. The students can add new notebooks to their own SL, for example to organize the entries about a particular class.

25 Finally, once the project is completed, the teammembers decide to make both the SL and other portions of the CPL available to the public to promote the new technology. This is accomplished by exporting the desired portions of the CPL and importing them into 30 HAL as an hyper library (HL). The HL has its own http address and can be accessed over the Internet by users equipped with HAL. A user could then search the HL, as well as other libraries (including both standalone libraries and hyper-libraries) accessible over the

Internet, to create his/her own notebooks on the new technology.

MACOS is a registered trademark of Apple Computer, Inc. of Cupertino, Calif., NETSCAPE NAVIGATOR is a 5 registered trademark of Netscape Communications Corp. of Mountain View, Calif. and INTERNET EXPLORER is a registered trademark of Microsoft Corp. of Redmond, Wash.

10 Embodiments described above illustrate but do not limit the invention. In particular, the invention is not limited by any number of journals or notebooks manipulated by the computer system, or by any particular hardware or software implementation.

15 Furthermore, the invention is not limited by the format of the journal window, the cockpit window or the notebook window shown in the drawings and described in the specification. Other window formats or other user interface techniques known in the art can be used in accordance to the principles of the invention. The 20 invention is also not limited to any number of computers connected to a network, or to any particular network implementation. Any suitable technique for computers to share information over a network can be used according to the invention. Other embodiments and 25 variations are within the scope of the invention, as defined by the following claims.

CLAIMS

1. A method for accessing, viewing and manipulating data stored in a computer system, comprising:

5 selecting a plurality of non-modifiable data objects stored in a storage of the computer system;

 creating references to the selected data objects;

10 adding the references to a first reference list; and

 manipulating the first reference list;

 wherein the first reference list and the data objects corresponding to the references contained in the first reference list are displayed in a single window of the computer system.

2. The method of claim 1, further comprising:

20 creating a plurality of modifiable data objects;

 storing the plurality of modifiable data objects on the storage device of the computer system; and

25 converting one or more modifiable data objects into non-modifiable data objects.

3. The method of claim 1, wherein each of the references to the non-modifiable data objects further comprises a modifiable tag field.

30

4. The method of claim 1, wherein each of the data objects contains a searchable comment field and a searchable tag field.

5. The method of claim 1, further comprising
storing the first reference list and the data objects
corresponding to the references in the first reference
5 list in a non-modifiable collection of data objects.

6. The method of claim 5, wherein the non-
modifiable collection of data objects is created on a
first computer and the method further comprises adding
10 a plurality of references to data objects stored in the
non-modifiable collection of data objects to a second
reference list stored on a second computer.

7. The method of claim 6, wherein the references
15 to the single data object are created by more than one
search of the data objects.

8. The method of claim 1, further comprising:
searching the data objects according to one
20 or more new search parameters;
in response to the search, creating one or
more new references to data objects satisfying the
search parameters and adding the new references to
the references in the first reference list.

25 9. The method of claim 1, wherein a reference to
a single data object is contained in more than one
reference list.

30 10. The method of claim 1, wherein the references
in the first reference list are organized in a user-
modifiable order.

11. The method of claim 1, wherein each data object comprises a unique identifier, one or more fields of meta-information and freeform content.

5 12. The method of claim 11, wherein the meta-information is used in searching the data objects and is displayed on the window of the computer system together with the data object.

10 13. The method of claim 1, wherein the data objects and the first reference list are stored on a first computer and a second reference list is stored on a second computer, the first computer being connected to the second computer by a computer network.

15

14. The method of claim 13, further comprising adding references in the first reference list to the second reference list.

20 15. The method of claim 14, wherein the network is a local area network.

16. The method of claim 14, wherein the network is a wide area network.

25

17. The method of claim 14, wherein the network is a global network.

30 18. The method of claim 13, further comprising a third computer, wherein the data objects are created on the third computer.

19. The method of claim 1, wherein one or more data objects comprise text data.

20. The method of claim 1, wherein one or more data objects comprise image data.

5 21. The method of claim 1, wherein one or more data objects comprise audio data.

22. The method of claim 1, wherein one or more data objects comprise multimedia data.

10

23. The method of claim 1, wherein the search parameters are automatically sifted by comparing a text portion of the data objects to a list of predetermined text segments to determine whether one or more of the 15 text segments occur within a text portion of the data objects.

24. The method of claim 23, wherein the predetermined text segments are stored and used in 20 successive sifting operations.

25. A computer system for accessing, viewing and manipulating data objects comprising:

25 a plurality of modifiable data objects stored in a storage of the computer system;

a plurality of non-modifiable data objects stored in the storage of the computer system;

a computer program; and

30 a computer executing the program, wherein the computer program includes instructions for:

selecting one or more non-modifiable data objects stored in the computer system;

creating references to the selected data objects;

adding the references to a reference list;
and

5 manipulating the reference list, wherein the
reference list and the data objects are displayed
on a single window of the computer system.

26. The computer system of claim 25, wherein the
computer program further includes instructions for
converting one or more modifiable data objects into
10 non-modifiable data objects.

27. A computer-readable storage medium comprising
a computer program, the computer program including
instruction for:

15 selecting one or more non-modifiable data
objects stored in a computer system;
creating references to the selected data
objects satisfying the search parameters;
adding the references to a reference list;

20 and
manipulating the reference list, wherein the
reference list and the data objects are displayed
on a single window of the computer system.

25 28. The computer-readable storage medium wherein
the computer program further includes instructions for
converting one or more modifiable data objects into
non-modifiable data objects.

30 29. A computer system for accessing, viewing and
manipulating data objects comprising:
a plurality of modifiable data objects stored in a
storage of the computer system;

a plurality of non-modifiable data objects stored in a storage of the computer system;

a plurality of references to the non-modifiable data objects; and

5 one or more lists of the references.

30. The computer system of claim 29, wherein one or more of the modifiable data objects are converted into non-modifiable data objects.

10

29. The computer system of claim 28, wherein a timestamp corresponding to the time of the conversion from modifiable data object into non-modifiable data object is added to the non-modifiable data object.

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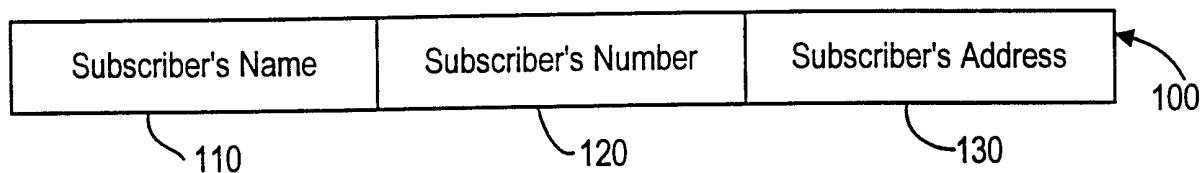


Fig. 1A (Prior Art)

Doe, John	987-5768	25 Pine Blvd.
Roe, Jane	243-5768	2657 1st St. #322
Roe, John	423-1251	1423 Sunset Ln.
Smith, John	786-2312	1 California Ave.

Callouts are present on the right side of the table, pointing to the right edge of each row. The callouts are labeled 150 for the first three rows and 140 for the bottom row.

Fig. 1B (Prior Art)

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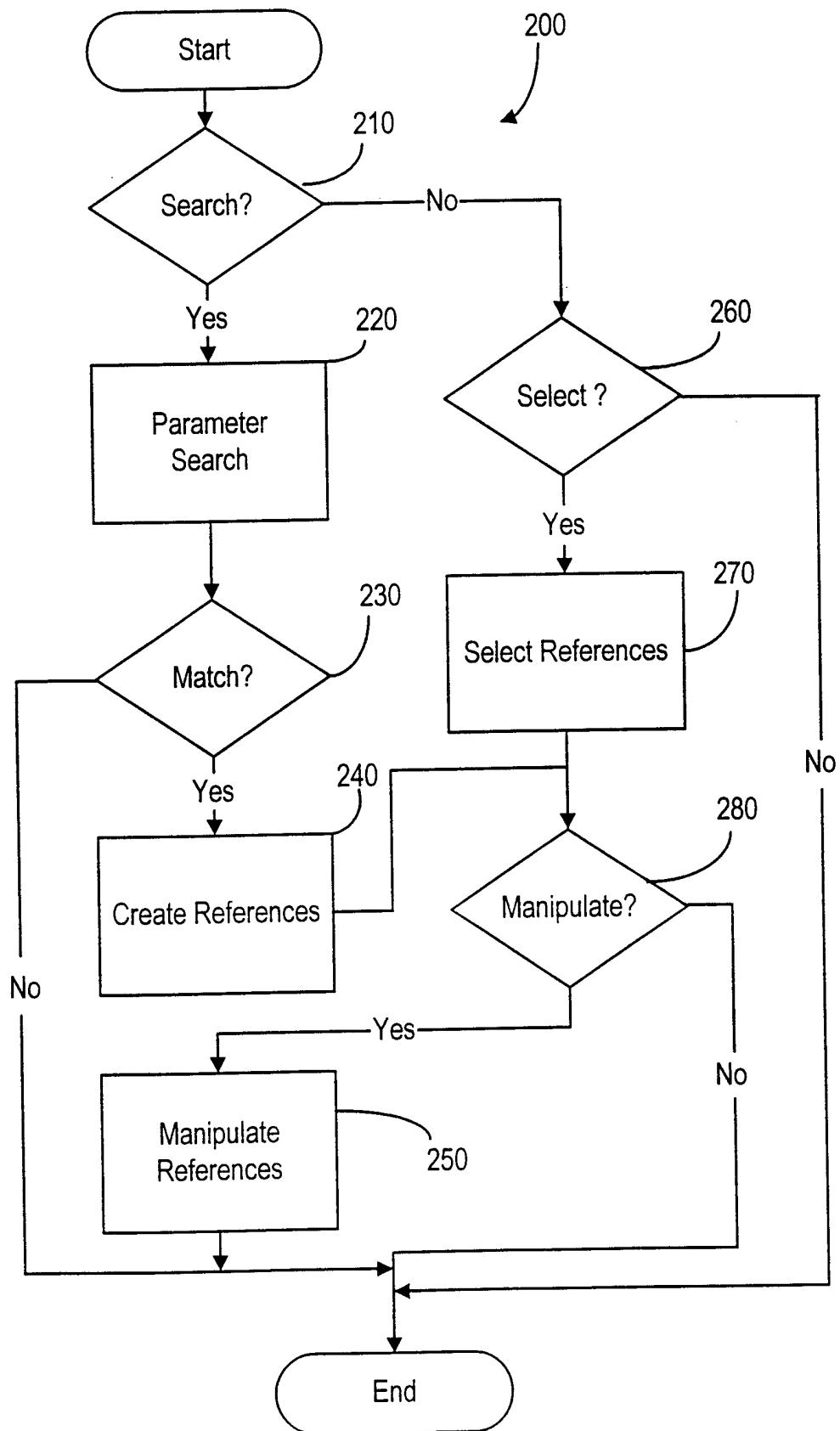


Fig. 2

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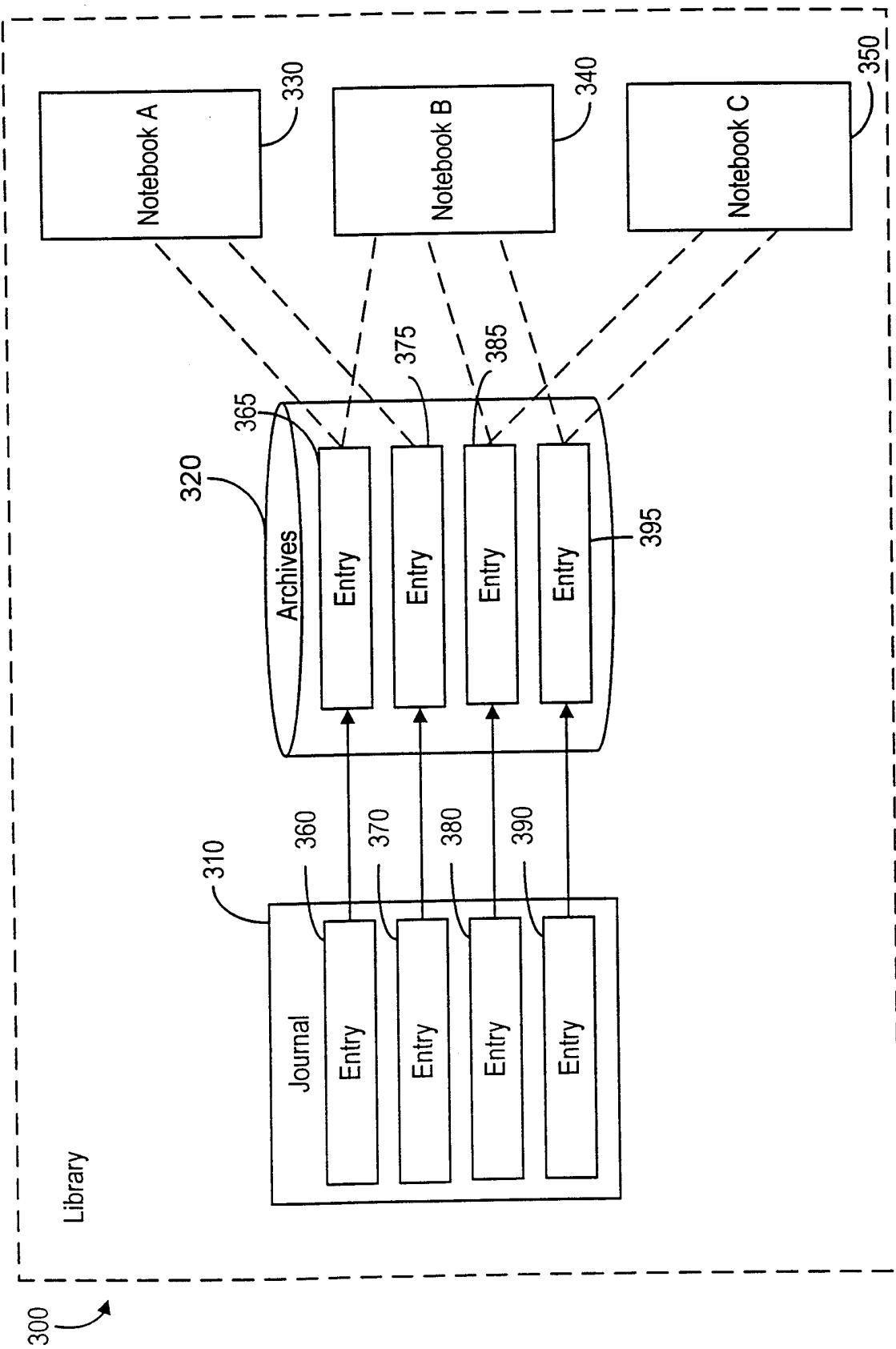


Fig. 3

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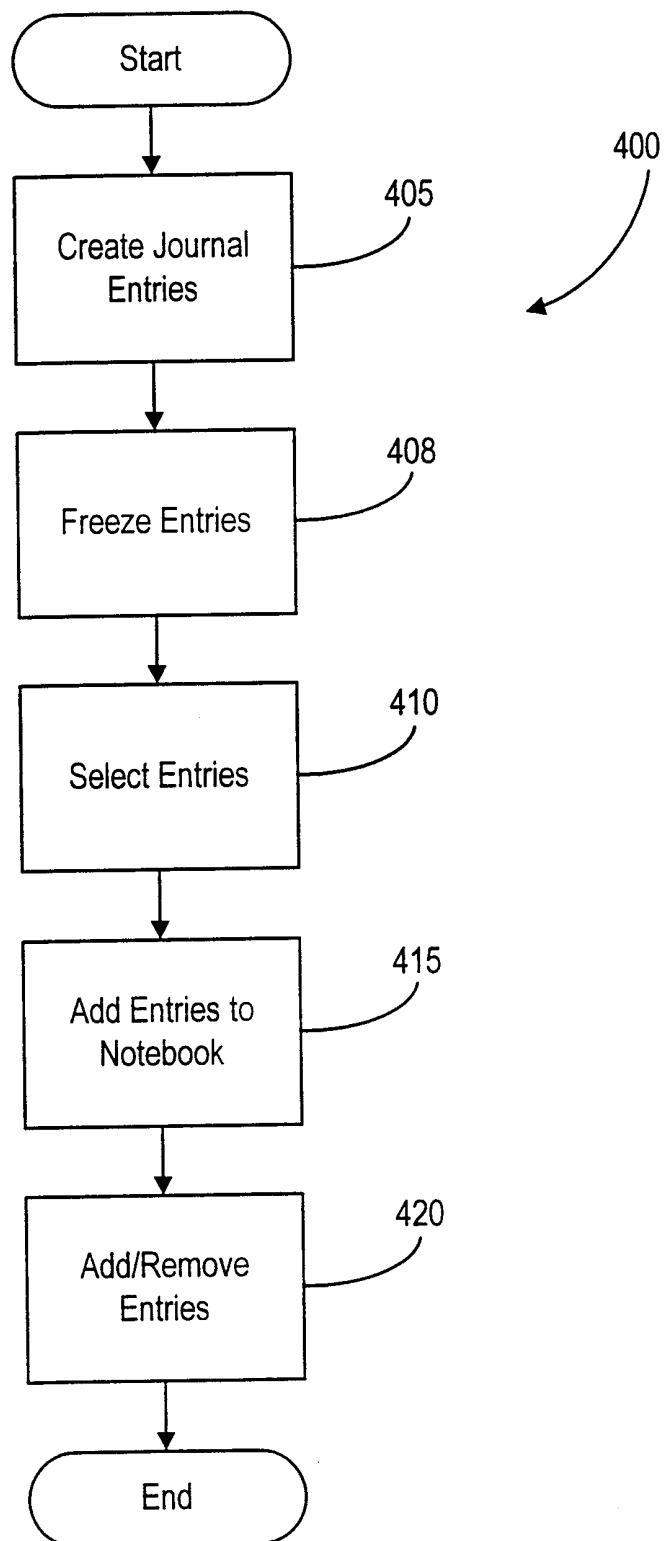


Fig. 4A

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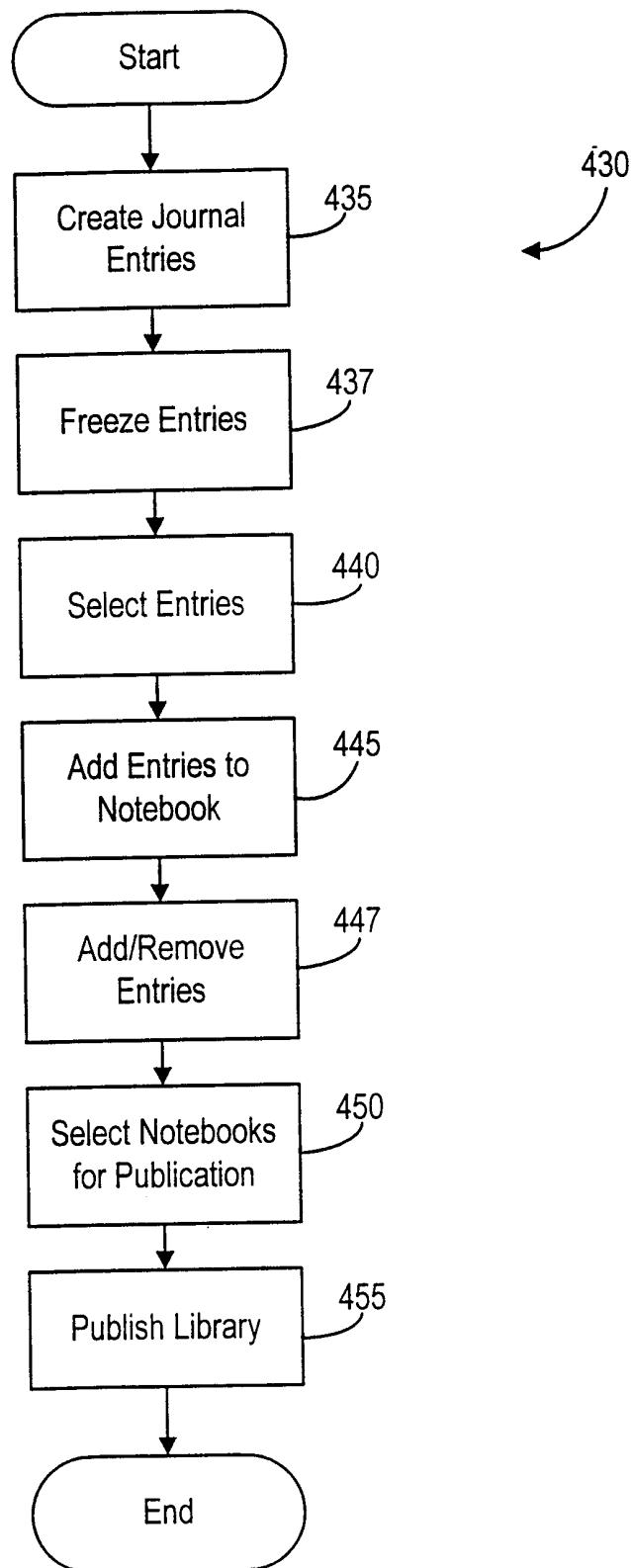


Fig. 4B

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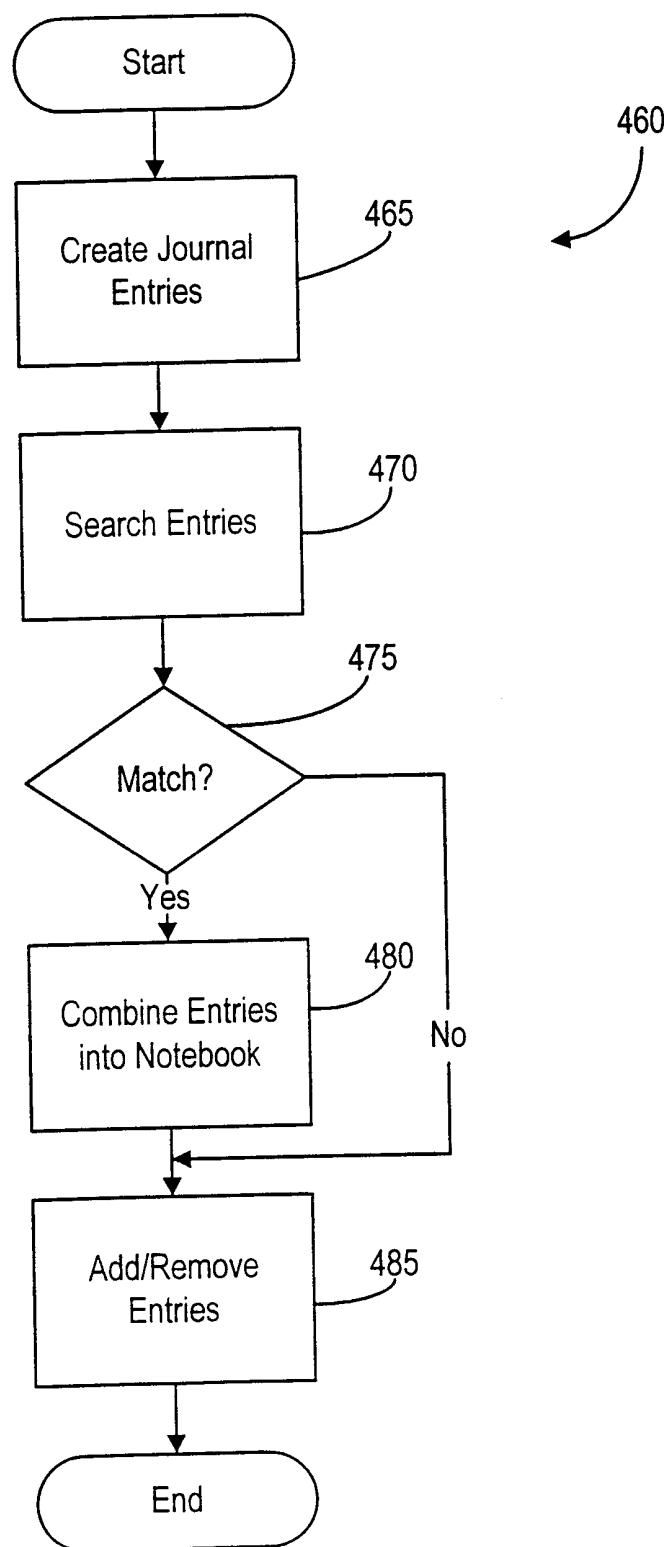


Fig. 4C

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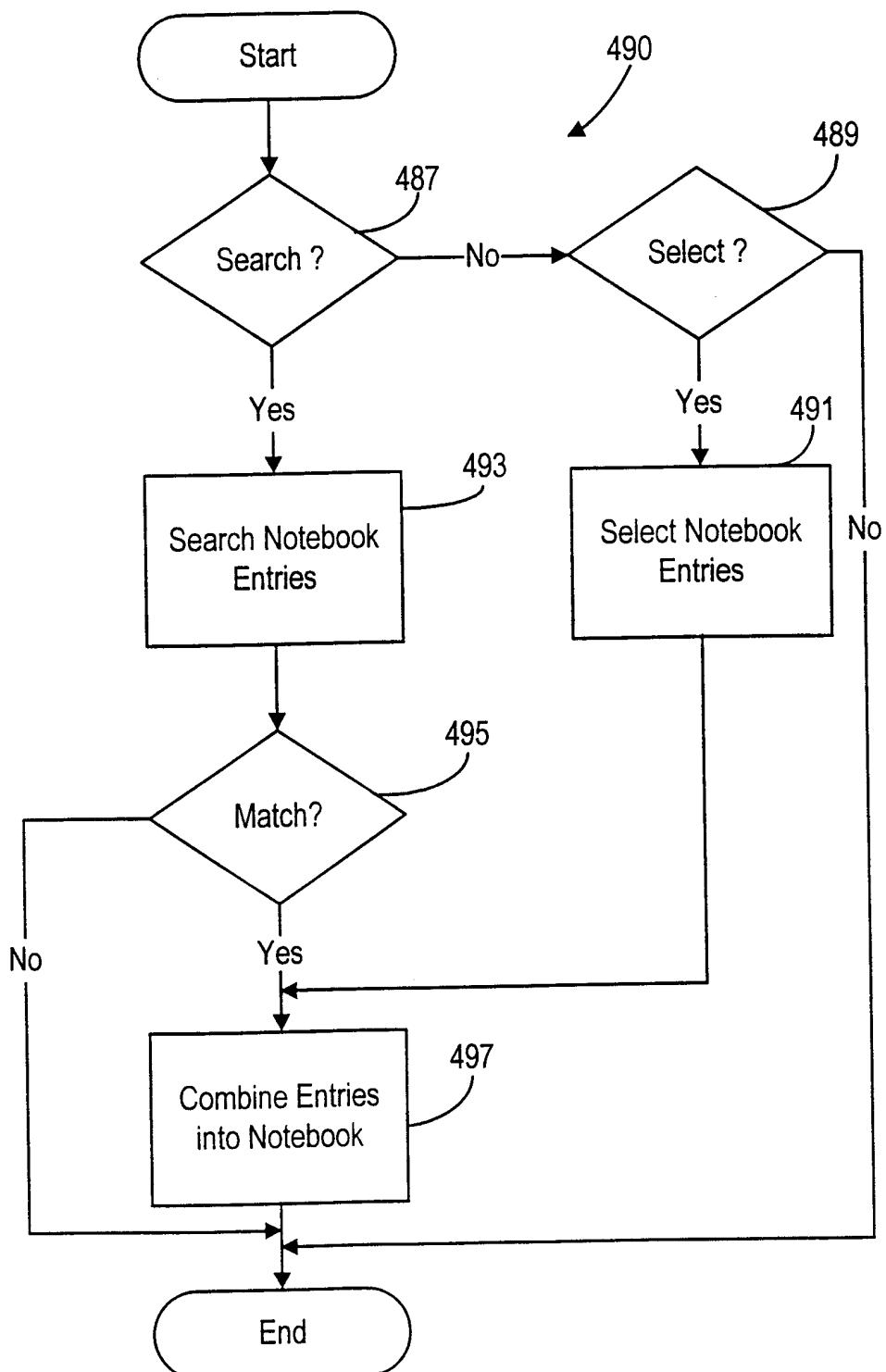


Fig. 4D

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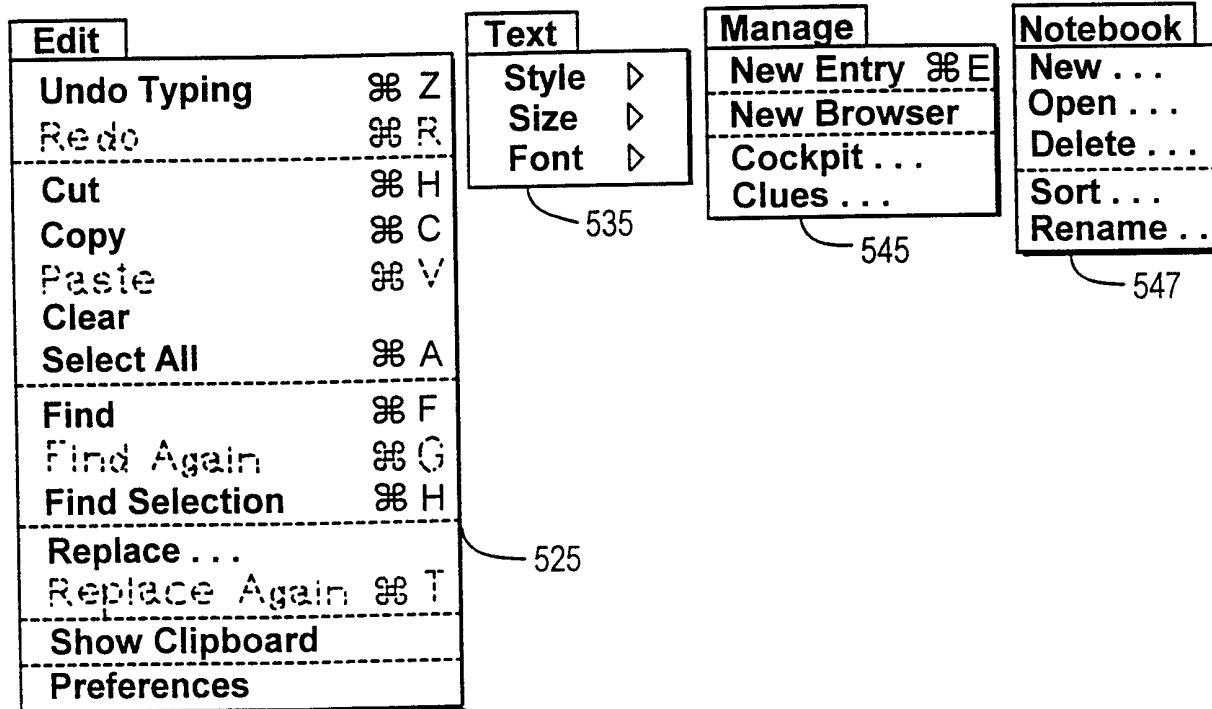
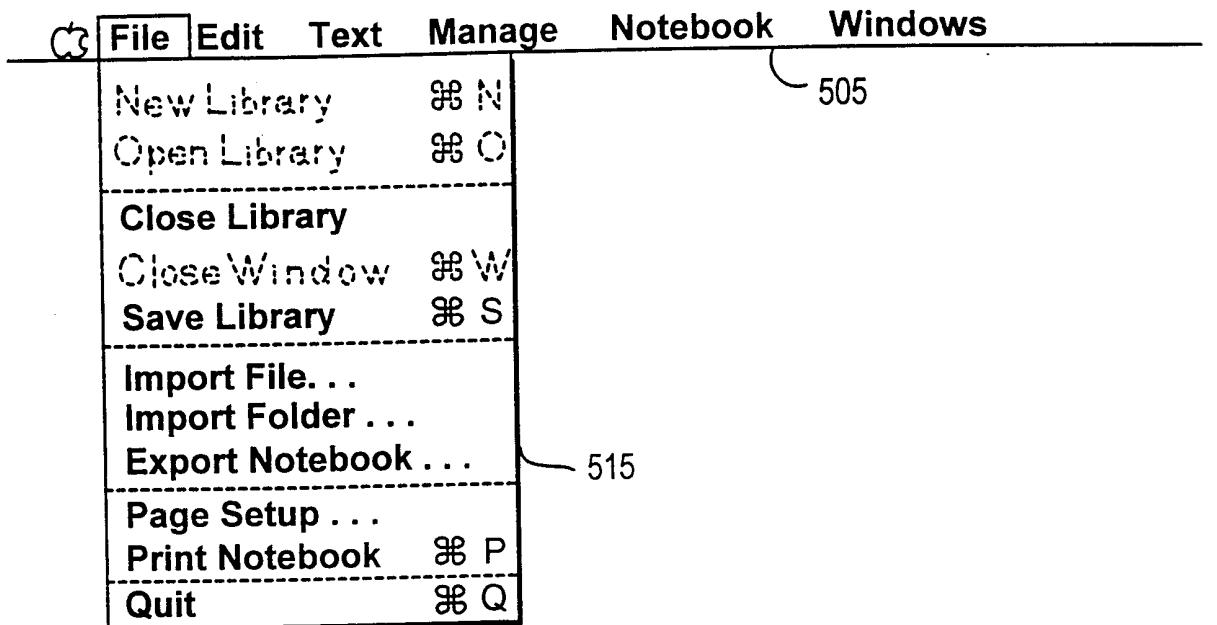


Fig. 5A

9/22

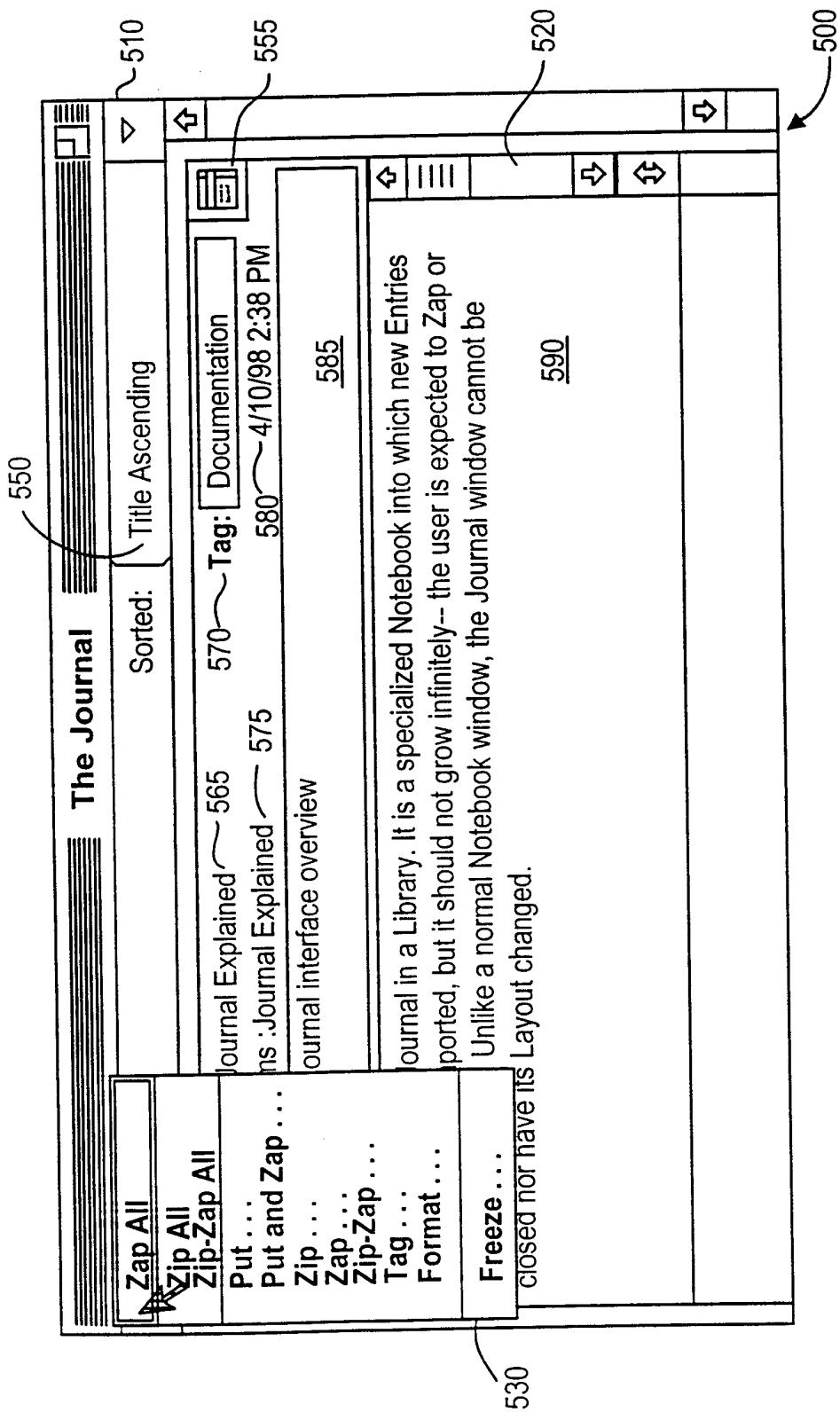


Fig. 5B

10/22

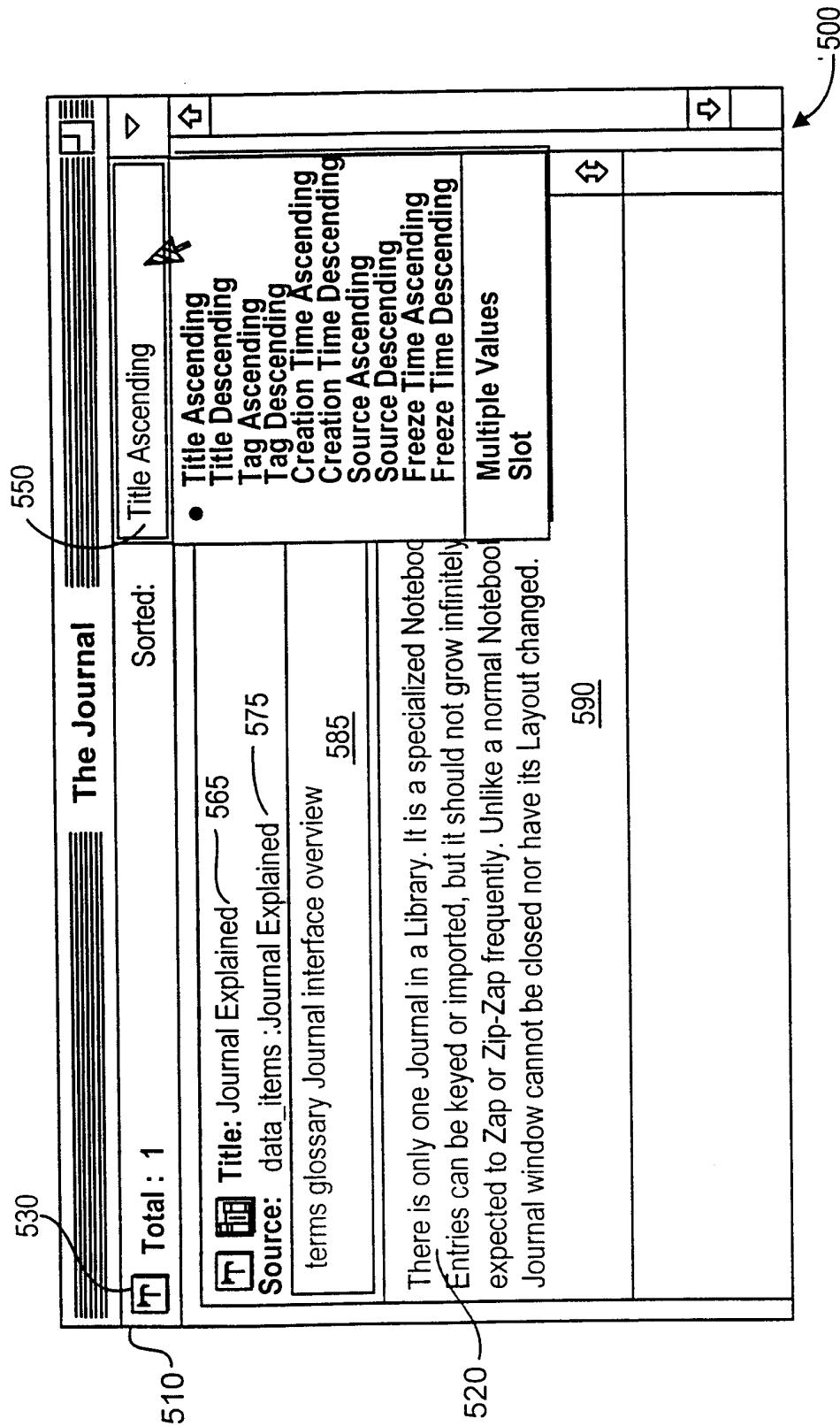


Fig. 5C

11/22

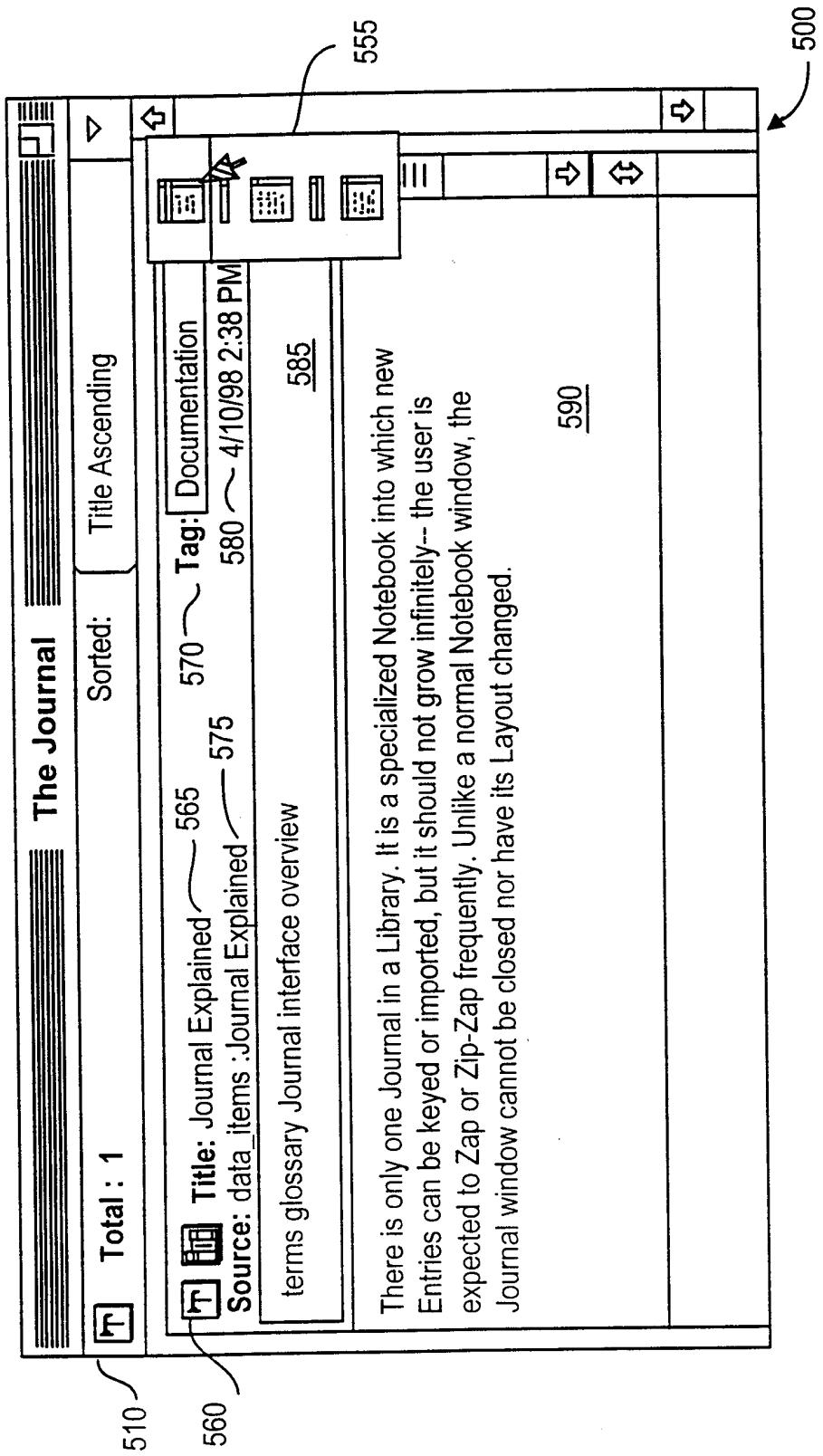


Fig. 5D

12/22

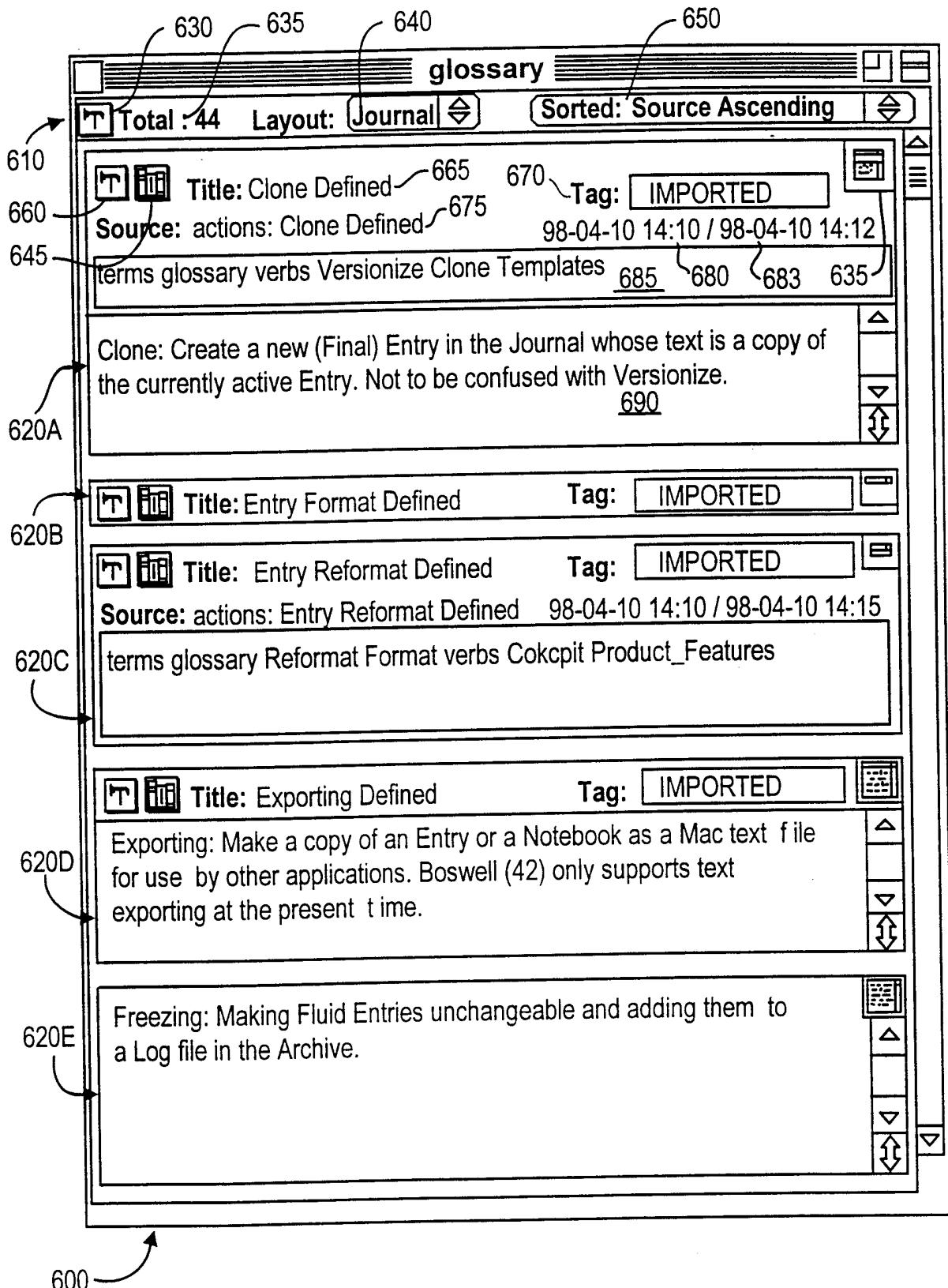


Fig. 6A

13/22

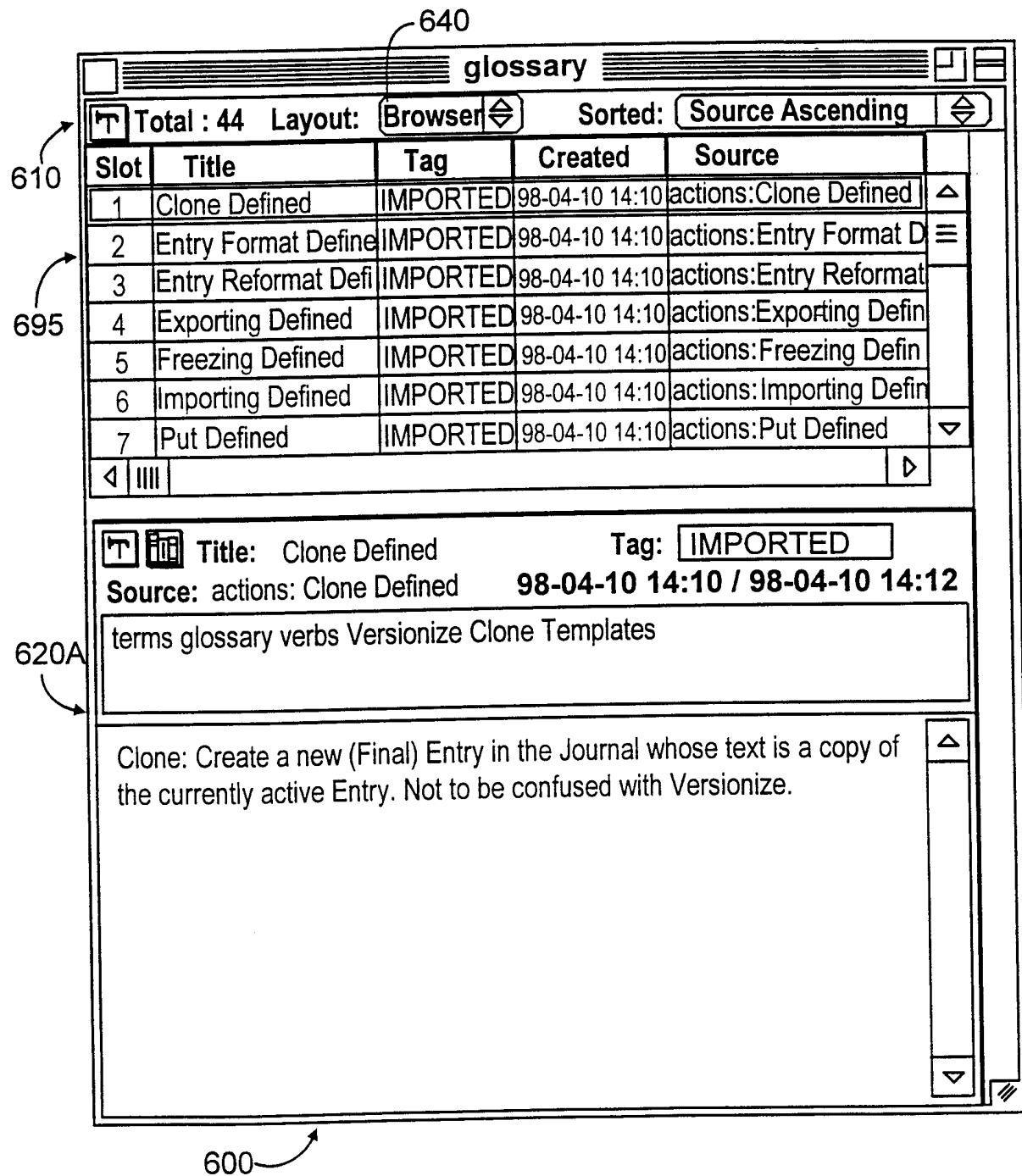


Fig. 6B

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Browser: Cockpit

Sorted: Source Ascending ◁

Slot	Title	Tag	Created	Source
1	Entry Format Defined	IMPORTED	98-04-1014:10	actions:Entry Format Defi
2	Entry Reformat Defined	IMPORTED	98-04-1014:10	actions:Entry Reformat D
3	Entry Reformat Explained	IMPORTED	98-04-1014:10	actions: Entry Reformat E
4	Exporting Defined	IMPORTED	98-04-1014:10	actions: Exporting Define
5	Importing Defined	IMPORTED	98-04-1014:10	actions: Importing Defined
6	Put Defined	IMPORTED	98-04-1014:10	actions: Put Defined
7	Put Explained	IMPORTED	98-04-1014:10	actions: Put Explained
8				

Tag: IMPORTED

Title: Exporting Defined

Source: actions:Exporting Defined 98-04-1014:10 / 98-04-1014:13

term glossary Exporting verbs Cockpit

Exporting: make a copy of an Entry or a Notebook as a Mac text file for use by other applications. Boswell (42) only supports text exporting at the present time.

710 ↗

700 ↗

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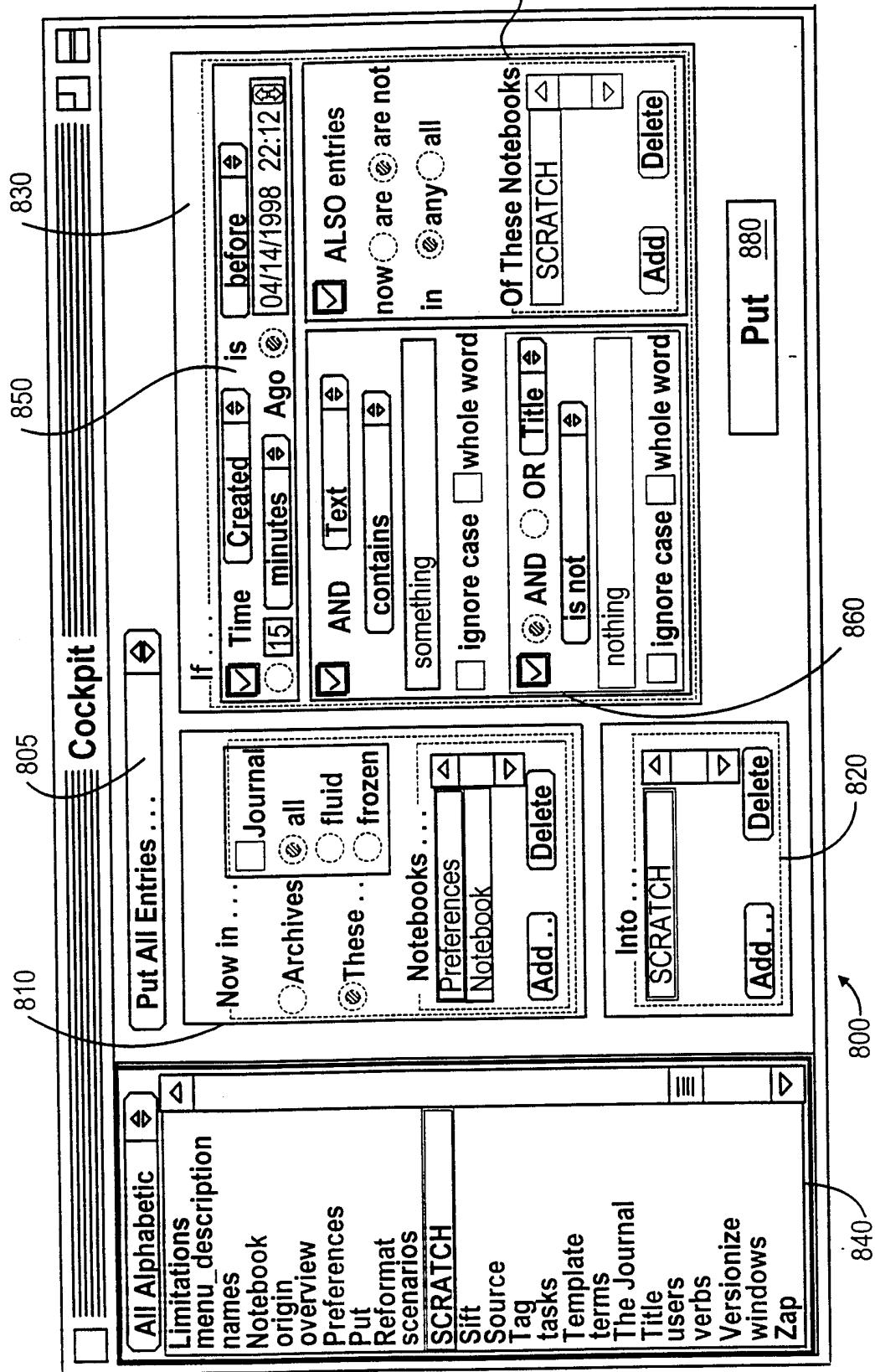


Fig. 8A

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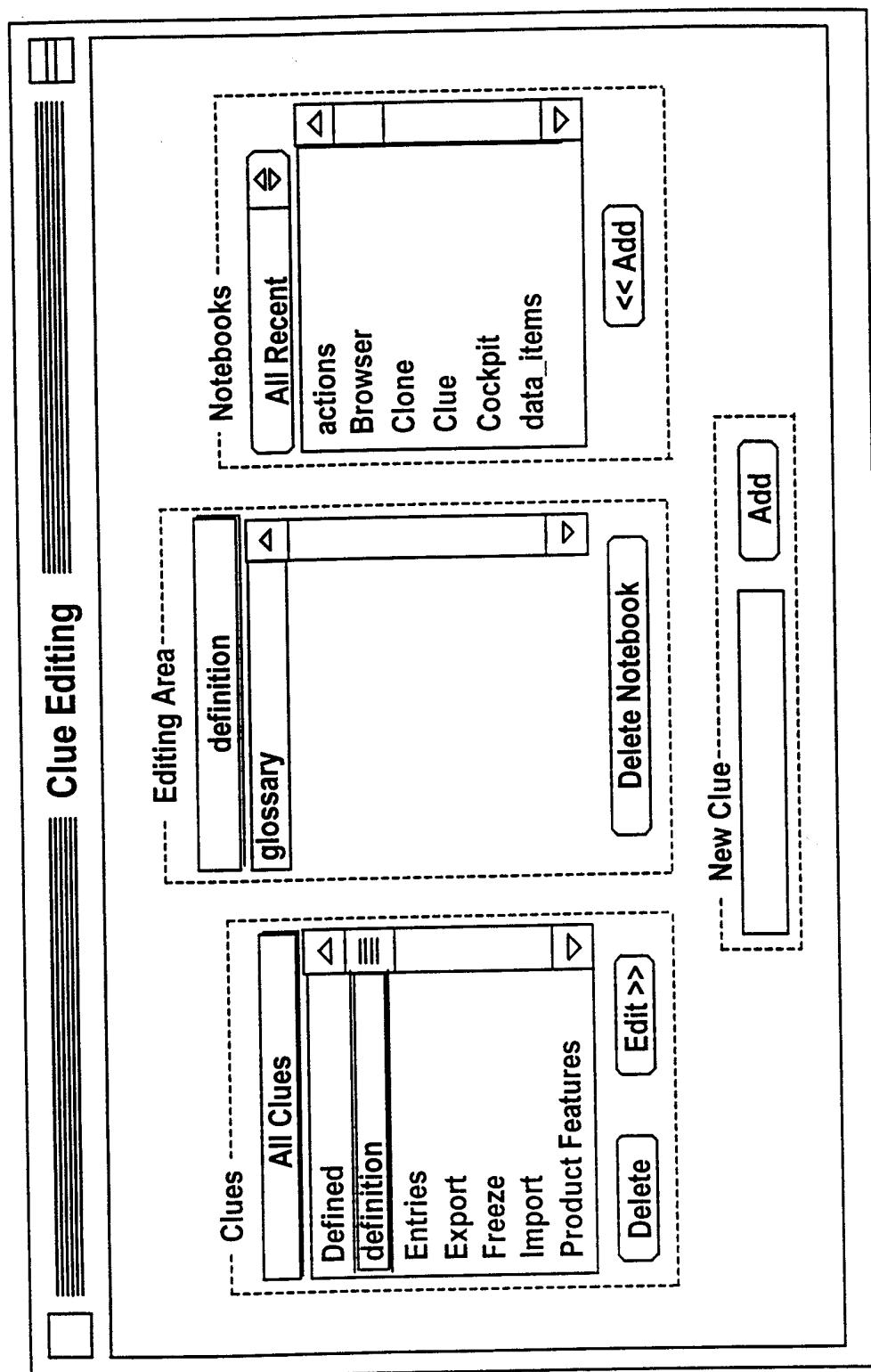


Fig. 8B

890

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Put

All Alphabetic	Selected Notebooks
actions	actions
Browser	Cockpit
Clone	Entry
Clue	Exporting
Cockpit	glossary
data_items	Notebook

897 → **Add** → 892

899 → **Delete** → 893

896 → **Put** → 895

Zap afterwards

Cancel

Fig. 8C

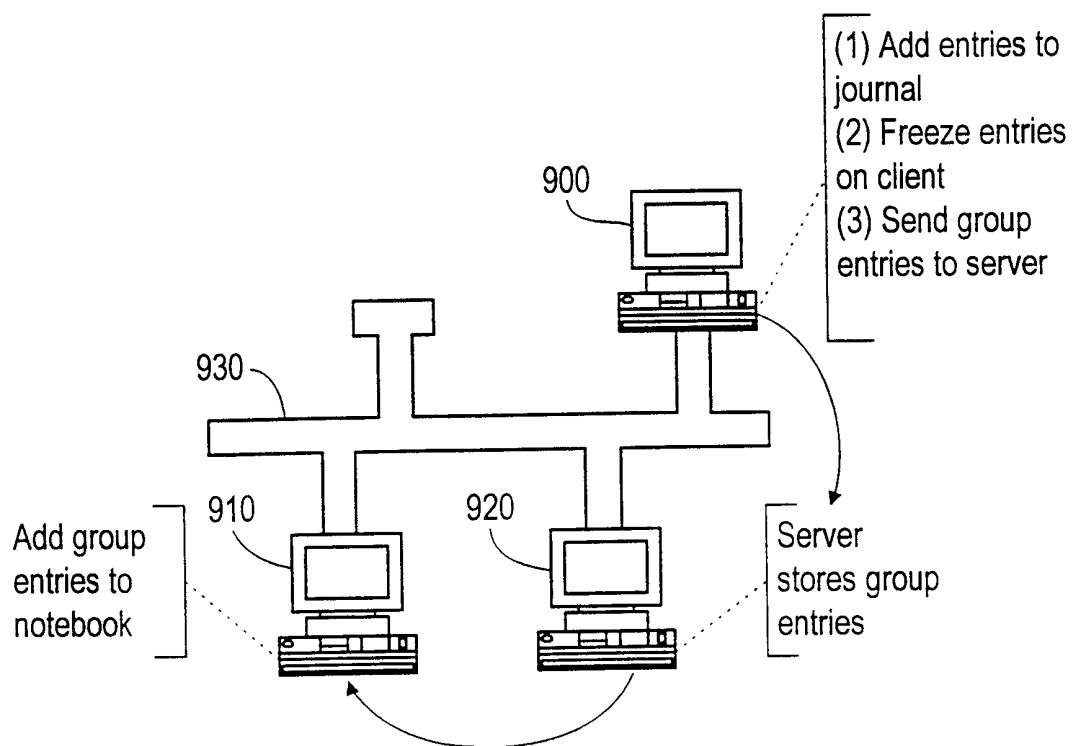


Fig. 9A

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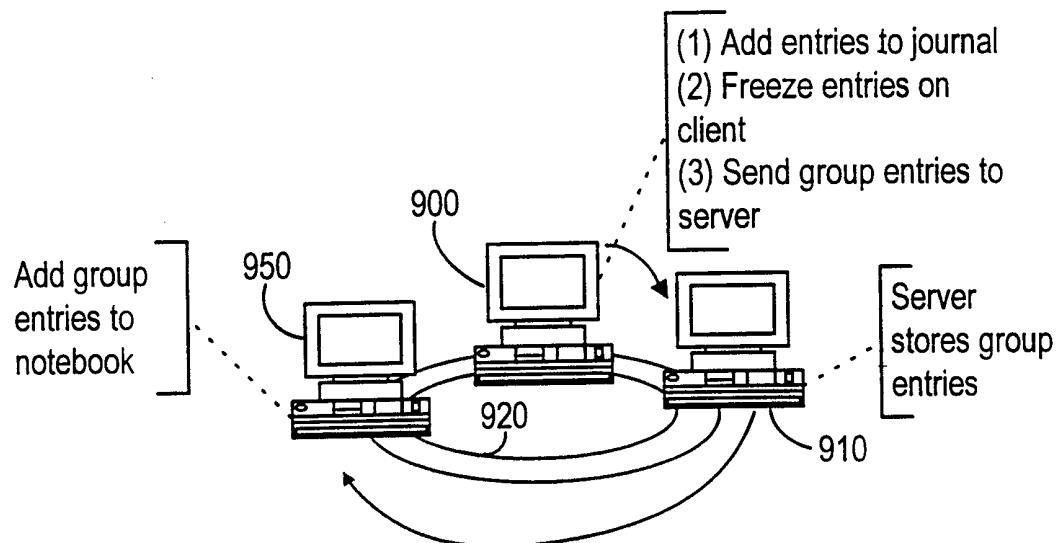


Fig. 9B

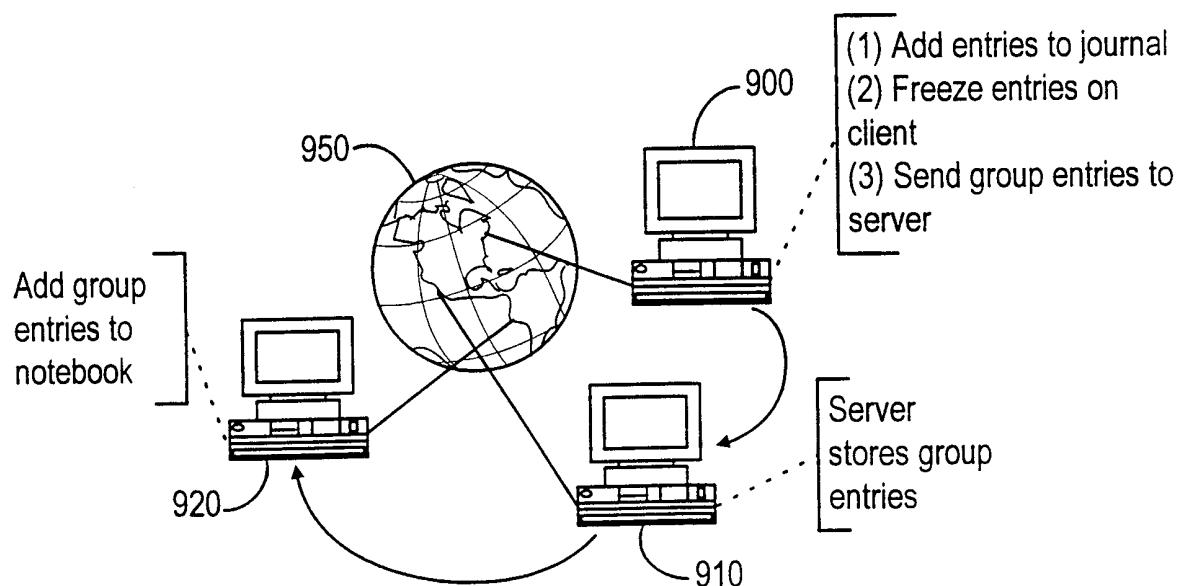


Fig. 9C

20/22

1060

1000

1010

1020

1030

1040

Netscape: The Harvard Thoreau Project Walden Library

Back Home Reload Images Open Print Find Location: <http://www.harvard.edu/literature/us/libraries/thoreau/walden.lib>

Walden: WLD01 Economy

Sorted: Title Ascending Title Descending

Slot	Title	Tag	Created	Source
1	WLD01-01 Sojourner	WALDEN	98-06-04 17:11	User
2	WLD01-02 Obtrude	WALDEN	98-06-04 17:23	Thoreau
3	WLD01-03 Your Condition	WALDEN	98-06-04 17:27	Thoreau
4	WLD01-04 Inherited Farms	WALDEN	98-06-04 17:30	Thoreau
5	WLD01-05	WALDEN	98-06-04 17:33	Thoreau
6	WLD01-06 Bloom on Fruits	WALDEN	98-06-04 17:35	Thoreau
7	WLD01-07 Making Yourselves Sick	WALDEN	98-06-04 17:36	Thoreau

Author

Walden Complete
WLD00 Contents
WLD01 Economy
WLD02 Where
WLD03 Reading
WLD04 Sounds
WLD05 Solitude
WLD06 Visitors
WLD07 Bean-Field
WLD08 Village
WLD09 Ponds
WLD10 Baker Farm
WLD11 Higher Laws
WLD12 Brute Neight
WLD13 House-Warm
WLD14 Inhabitants
WLD15 Winter Anima
WLD16 Pond in Wint
WLD17 Spring
WLD18 Conclusion

Tag: WALDEN

98-06-04 17:11 / 98-06-04 17:14

Source: User

One of the most famous openings in American Literature.

When I wrote the following pages, or rather the bulk of them, I lived alone, in the woods, a mile from any neighbor, in a house which I had build myself, on the shore of Walden Pond, in Concord, Massachusetts, and earned my living by the labor of my hands only. I lived there two years and two months. At the present I am a sojourner in civilized life again.

?

Fig. 10 B

1060 →

1100 →

1110 →

1120 →

21/22 →

1130 →

1140 →

1160 →

HyperBrowser: The Harvard Thoreau Project Walden Library

Location: <http://www.harvard.edu/literature/us/libraries/thoreau/walden.lib>

Libraries

Academy Awards	Doonesbury	Dublin Pubs	Fullerania	Gogarty	Harvard Alumni	Jimenez	Joyce	Leopardi	Literary Quotations	National Geographic	Proust	Scientific American	Shakespeare	Spice Girls History	Superman Comics	Thoreau	Twain	USER	Wozniak	Yeats
----------------	------------	-------------	------------	---------	----------------	---------	-------	----------	---------------------	---------------------	--------	---------------------	-------------	---------------------	-----------------	---------	-------	------	---------	-------

Notebooks

Author	Walden Complete	WL D00 Content	WL D01 Economy	WL D02 Where	WL D03 Reading	WL D04 Sounds	WL D05 Solitude	WL D06 Visitors	WL D07 Bean-Fi
--------	-----------------	----------------	----------------	--------------	----------------	---------------	-----------------	-----------------	----------------

WLD01 Economy

Sorted: Title Ascending Title Descending

Slot	Title	Tag	Created	Source
1	WLD01-01 Sojourner	WALDEN	98-06-04 17:11	User
2	WLD01-02 Obtrude	WALDEN	98-06-04 17:23	Thoreau
3	WLD01-03 Your Condition	WALDEN	98-06-04 17:27	Thoreau
4	WLD01-04 Inherited Farms	WALDEN	98-06-04 17:30	Thoreau
5	WLD01-05	WALDEN	98-06-04 17:33	Thoreau
6	WLD01-06 Bloom on Fruits	WALDEN	98-06-04 17:35	Thoreau
7	WLD01-07 Making Yourselves Si	WALDEN	98-06-04 17:36	Thoreau

Reader

Boyhood Refs	Goose Refs	Poetry	Pond Refs	Railroad Refs	Quotations	School Refs
--------------	------------	--------	-----------	---------------	------------	-------------

WALDEN

Title: WLD01-01 Sojourner
Source: User

98-06-04 17:11 / 98-06-04 17:14

One of the most famous openings in American Literature.

When I wrote the following pages, or rather the bulk of them, I lived alone, in the woods, a mile from any neighbor, in a house which I had build myself, on the shore of Walden Pond, in Concord, Massachusetts, and earned my living by the labor of my hands only. I lived there two years and two months. At the present I am a sojourner in civilized life again.

Fig. 11

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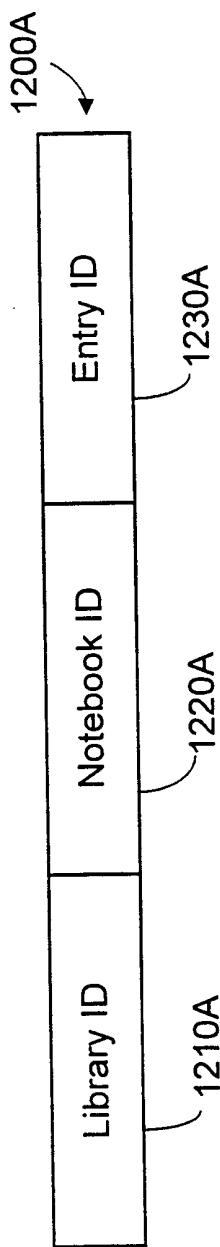


Fig. 12 A

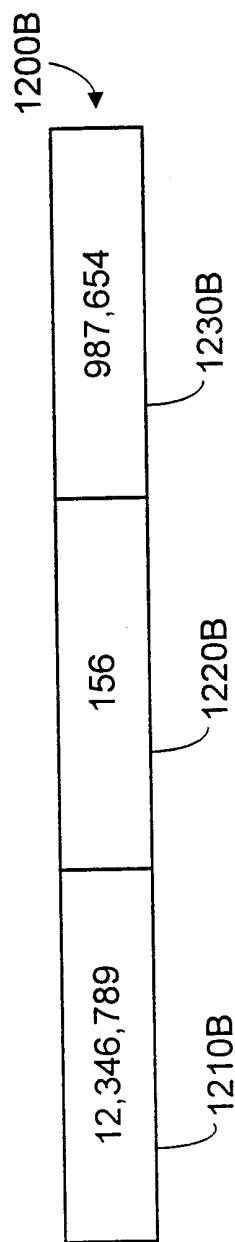


Fig. 12 B

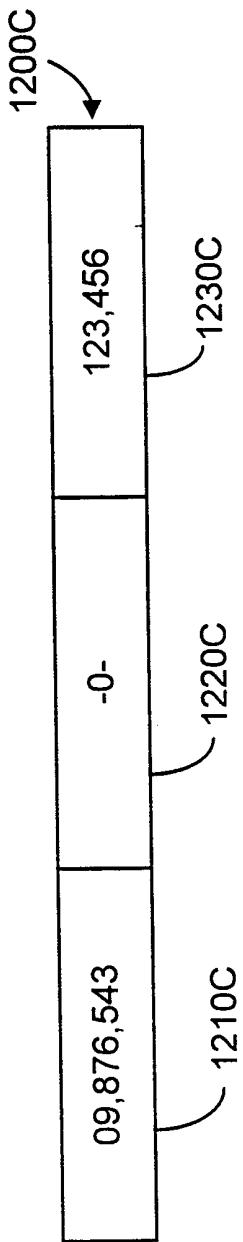


Fig. 12 C

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US99/14478

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) : G06F 17/30, 13/00, 15/00, 15/40, 3/00
 US CL : 709/218, 219, 203; 707/10, 8, 513

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 709/218, 219, 203; 707/10, 8, 513

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
 Internet

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
 APS, EAST, WEST 1.1a

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 96/23265 (DAVIES et al.) 01 August 1996, Abstract, entire document.	1-29
X	US 5,761,662 A (DASAN) 02 June 1998, Abstract, entire document.	1-29
X	US 5,632,022 A (WARREN et al.) 20 May 1997, Abstract, entire document.	1-29
X	US 5,717,925 A (HARPER et al.) 10 February 1998, Abstract, Figures 1-14, entire document.	1-29
X	US 5,694,594 A (CHANG) 02 December 1997, Abstract, Figures 1-9, entire document.	1-29
X	US 5,727,175 A (MALONE et al.) 10 March 1998, Abstract, entire document.	1-29

Further documents are listed in the continuation of Box C.

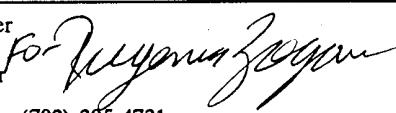
See patent family annex.

* Special categories of cited documents	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E" earlier document published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"I" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&"	document member of the same patent family
"O" document referring to an oral disclosure, use, exhibition or other means		
"P" document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search
 06 AUGUST 1999

Date of mailing of the international search report
 22 OCT 1999

Name and mailing address of the ISA/US
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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US99/14478

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5,649,186 A (FERGUSON) 15 July 1997, Abstract, Figures 1-6, entire document.	1-29
X	US 5,408,655 A (OREN et al.) 18 April 1995, Abstract, entire document.	1-29
A	US 5,491,820 A (BELOVE et al.) 13 February 1996, Abstract.	1-29
A	US 5,623,652 A (VORA et al.) 22 April 1997, Abstract, Figures 1-12, entire document	1-29
A	US 5,717,923 A (DEDRICK) 10 February 1998, Abstract.	1-29
A	US 5,761,656 A (BEN-SHACHAR) 02 June 1998, Abstract.	1-29
X,P	US 5,838,326 A (CARD et al.) 17 November 1998, Abstract, Figures 1-12, entire document.	1-29
X,P	US 5,778,367 A (WESINGER, JR. et al.) 07 July 1998, Abstract, Figures 1-5, entire document.	1-29