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(54) SYSTEM FOR CONVERTING SCROLLING DISPLAY TO NON-SCROLLING COLUMNAR DISPLAY

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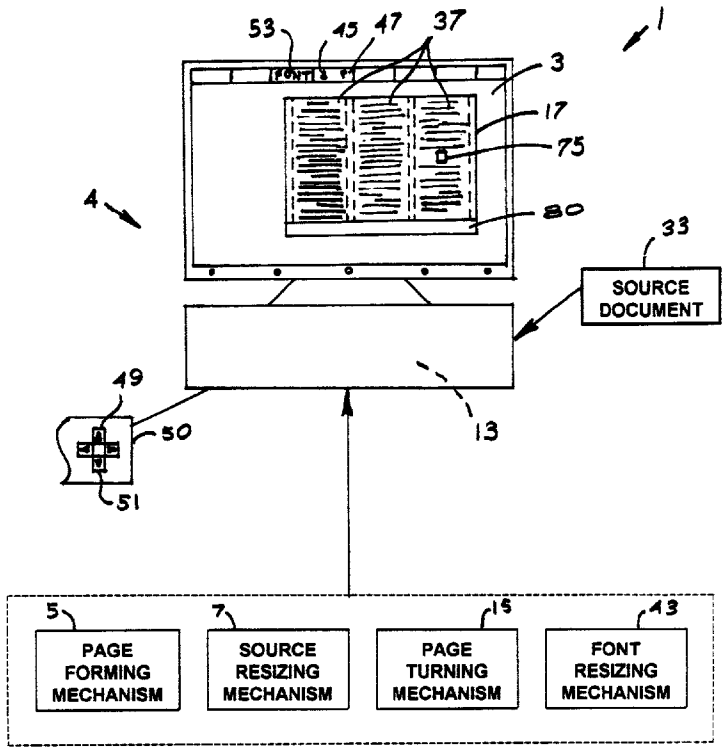
(57) ABSTRACT

A computer system for automatically converting a scrollable electronic document, including text, graphics, tables and combinations, from a scrollable format to a non-scrollable format, the system comprising a page-forming mechanism configured to operatively and automatically arrange the scrollable electronic information document into a plurality of non-scrollable pages, each having one or more columns wherein each of the columns has a width corresponding to a number of characters per line within a predetermined range of characters per line, a content formatter mechanism configured to be operatively responsive to embedded formatting commands, either common word-processing commands or html commands or both; a font-sizing mechanism configured to operatively permit a user to selectively alter the size of the characters comprising the non-scrollable pages; an image sizing mechanism configured either to automatically alter the widths of graphic images and tables in the electronic document to proportionately conform to the width of the columns, or to reduce the graphic images and tables to selectively expandable icons positioned in the display; a screen having a display window configured to entirely display a selected one of the non-scrollable pages; and a page-turning mechanism configured to selectively, sequentially and individually display the plurality of non-scrollable pages in the display window. A method is provided for practicing the system.



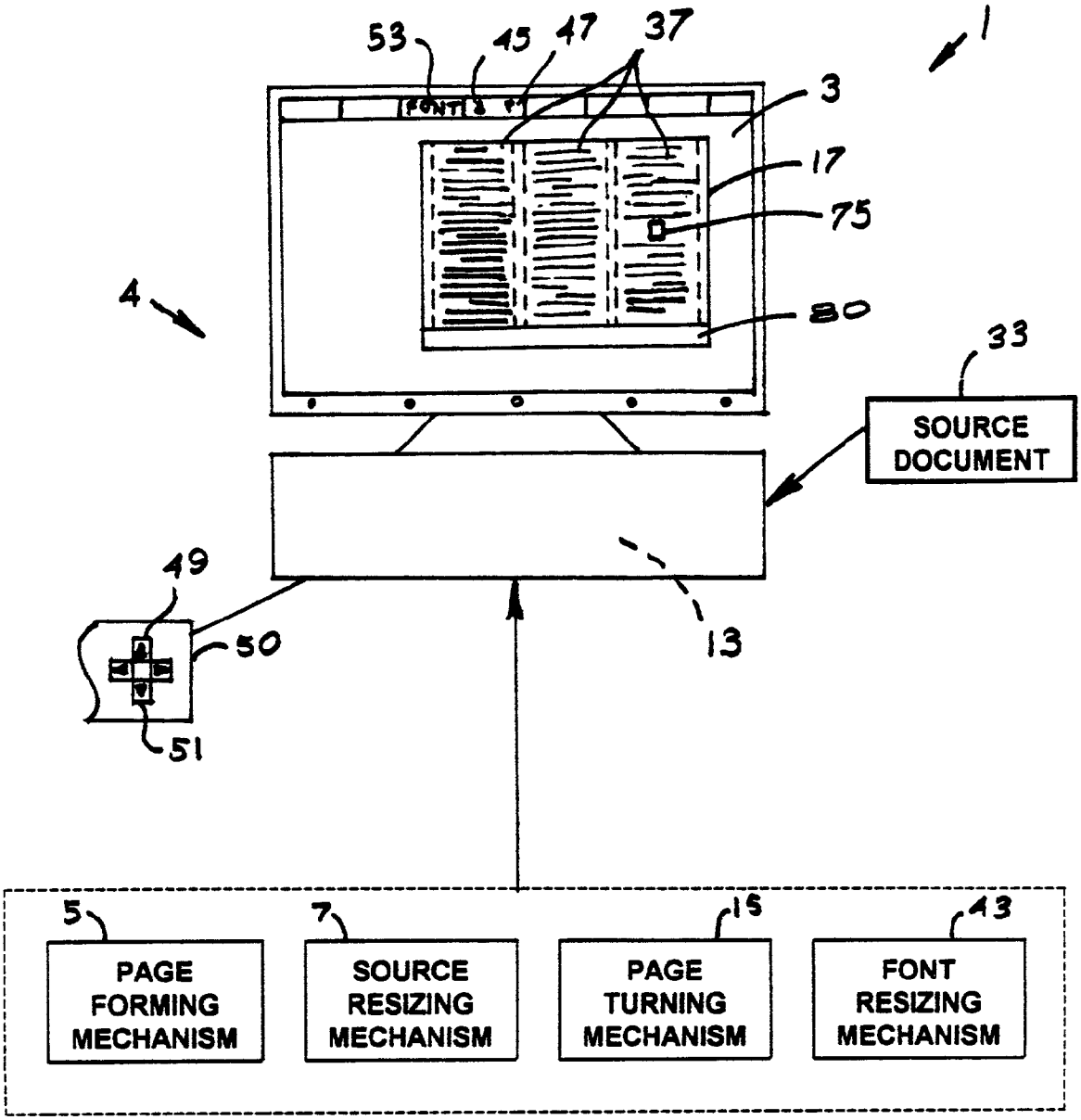

1
53
45
47
37
3
17
75
80
4
33
SOURCE DOCUMENT
49
50
51
13
5
PAGE FORMING MECHANISM
7
SOURCE RESIZING MECHANISM
15
PAGE TURNING MECHANISM
43
FONT RESIZING MECHANISM

FIG. 1

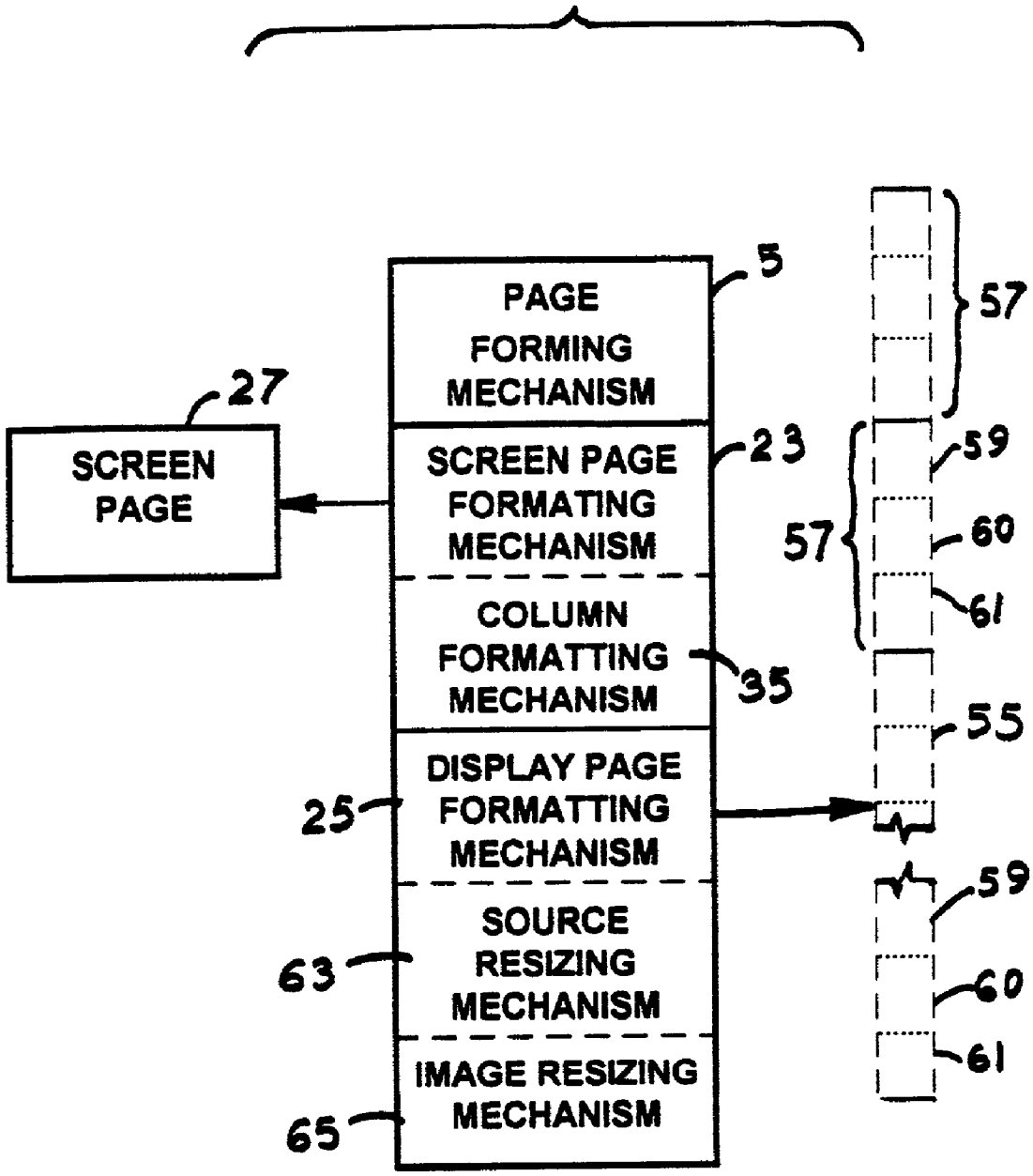

PAGE FORMING MECHANISM
5
SCREEN PAGE
27
SCREEN PAGE FORMATING MECHANISM
23
COLUMN FORMATTING MECHANISM
35
DISPLAY PAGE FORMATTING MECHANISM
25
SOURCE RESIZING MECHANISM
63
IMAGE RESIZING MECHANISM
65
57
59
60
61
55

FIG. 2

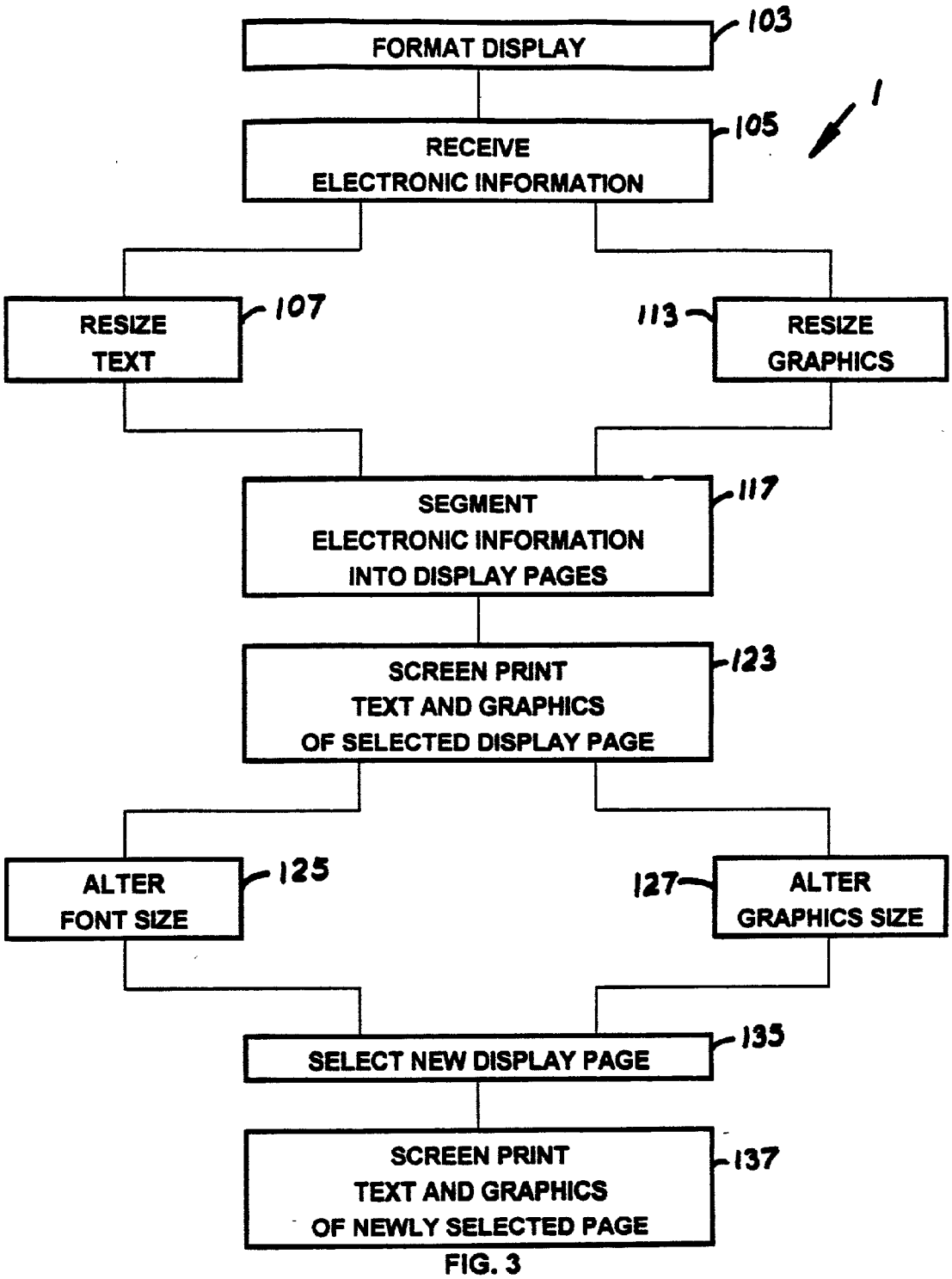

FORMAT DISPLAY
103
1
RECEIVE ELECTRONIC INFORMATION
105
RESIZE TEXT
107
113
RESIZE GRAPHICS
SEGMENT ELECTRONIC INFORMATION INTO DISPLAY PAGES
117
SCREEN PRINT TEXT AND GRAPHICS OF SELECTED DISPLAY PAGE
123
ALTER FONT SIZE
125
127
ALTER GRAPHICS SIZE
SELECT NEW DISPLAY PAGE
135
SCREEN PRINT TEXT AND GRAPHICS OF NEWLY SELECTED PAGE
137

FIG. 3

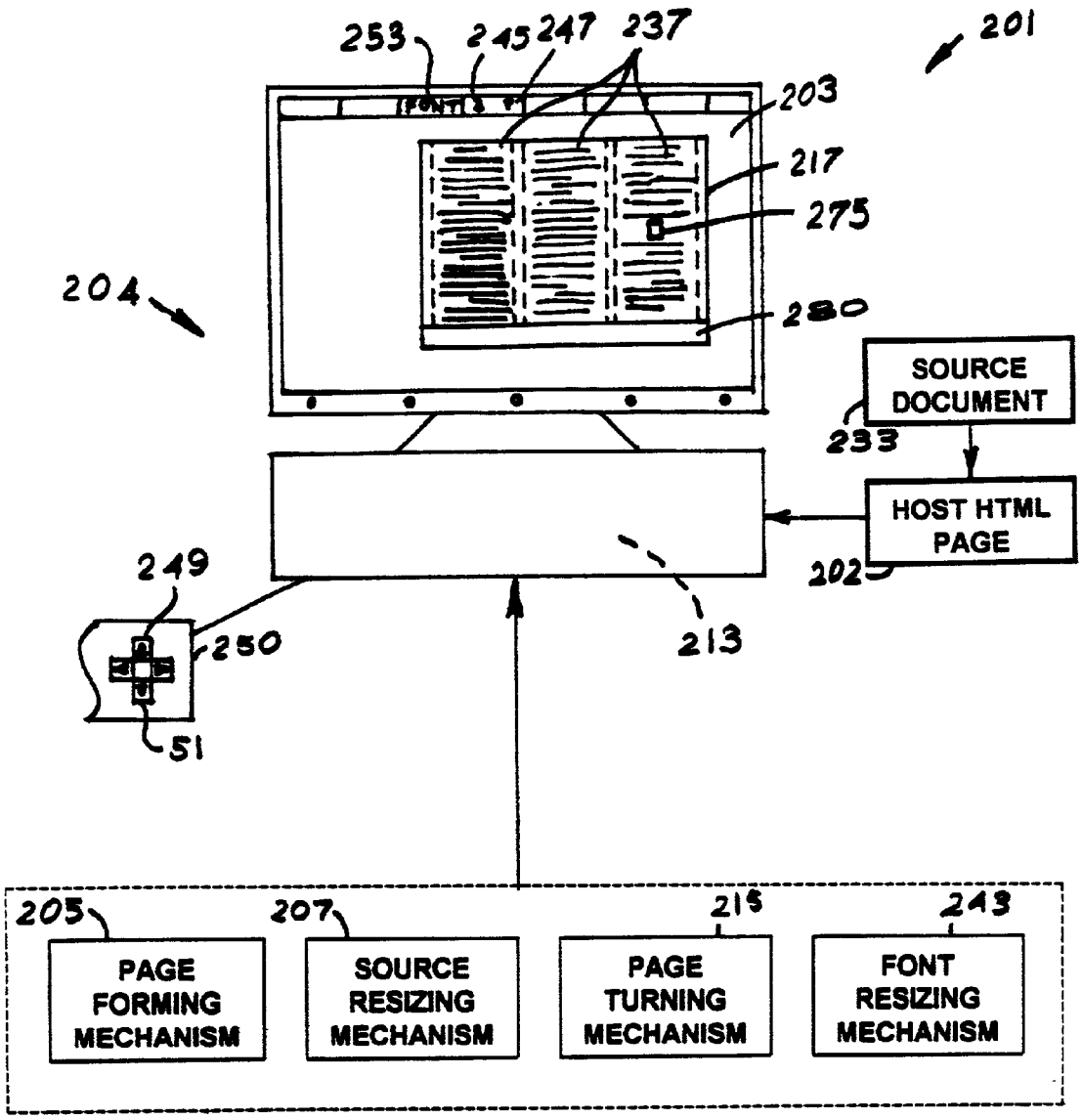

253
245
247
237
201
203
217
275
204
280
SOURCE DOCUMENT
233
HOST HTML PAGE
202
249
250
213
51
205
207
215
243
PAGE FORMING MECHANISM
SOURCE RESIZING MECHANISM
PAGE TURNING MECHANISM
FONT RESIZING MECHANISM

FIG. 4

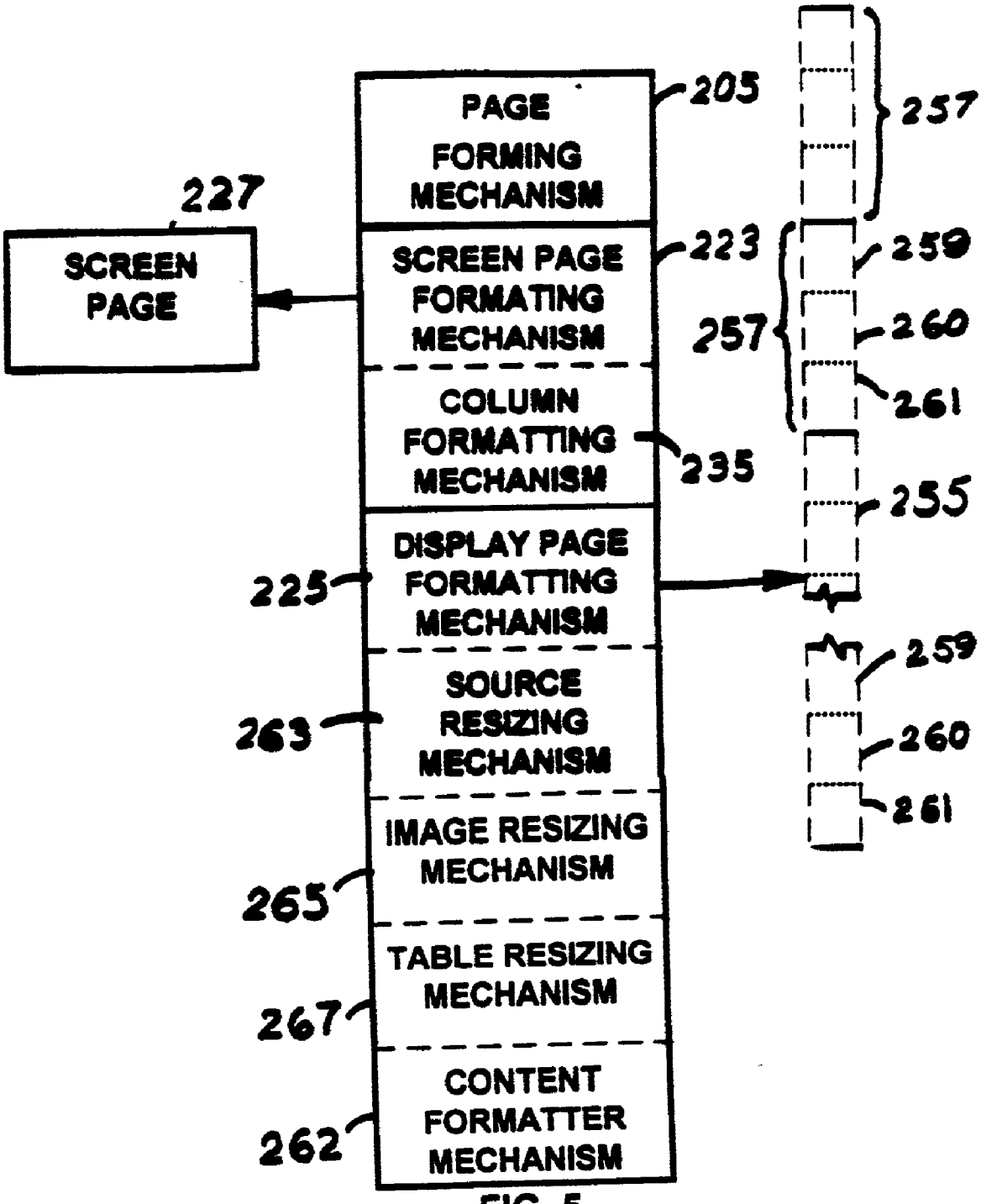

PAGE FORMING MECHANISM
205
257
227
SCREEN PAGE
SCREEN PAGE FORMATING MECHANISM
223
259
257
260
261
COLUMN FORMATTING MECHANISM
235
255
DISPLAY PAGE FORMATTING MECHANISM
225
259
SOURCE RESIZING MECHANISM
263
260
261
IMAGE RESIZING MECHANISM
265
TABLE RESIZING MECHANISM
267
CONTENT FORMATTER MECHANISM
262

FIG. 5

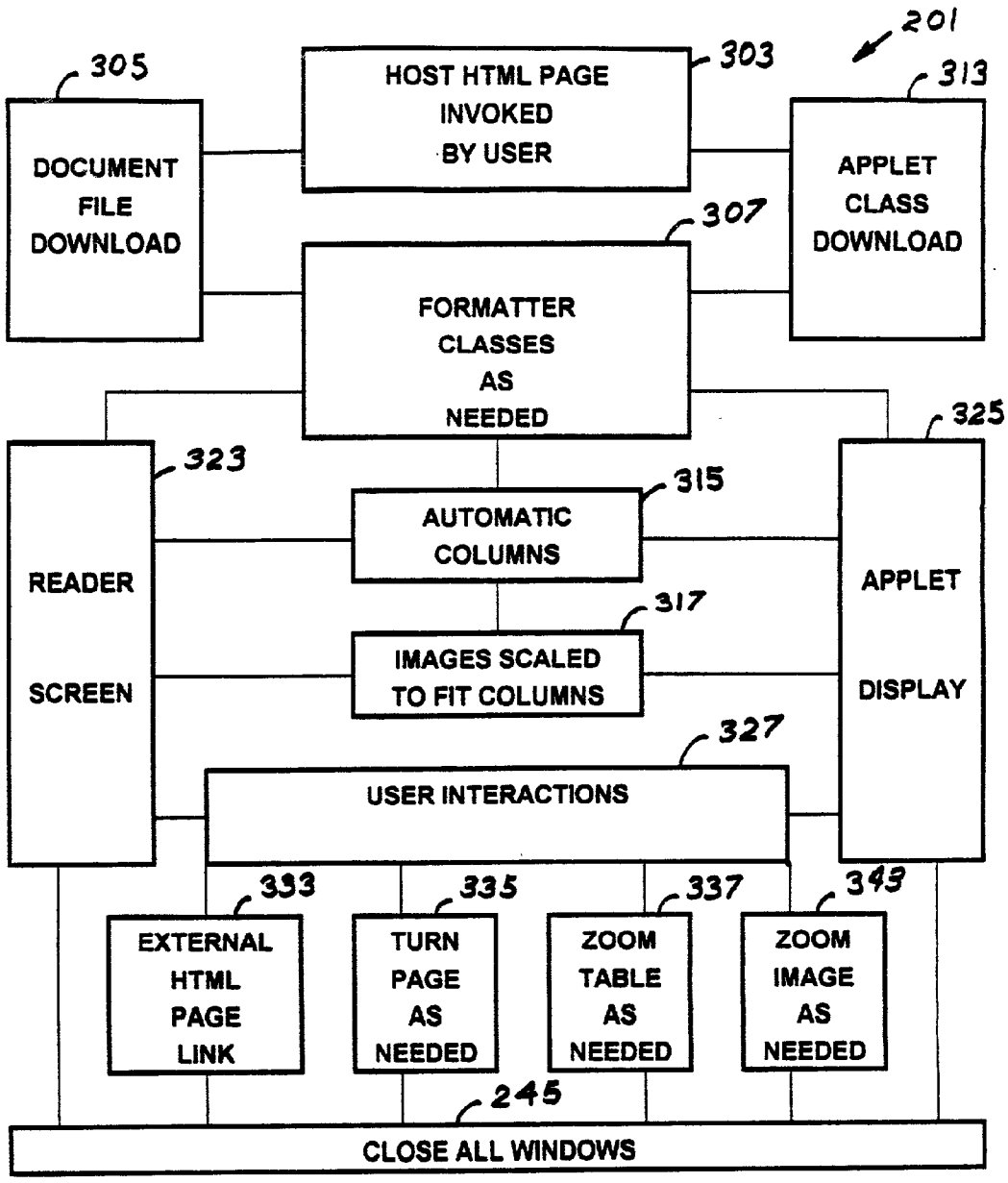

201
305
303
313
DOCUMENT FILE DOWNLOAD
HOST HTML PAGE INVOKED BY USER
APPLET CLASS DOWNLOAD
307
FORMATTER CLASSES AS NEEDED
325
323
315
READER SCREEN
AUTOMATIC COLUMNS
APPLET DISPLAY
317
IMAGES SCALED TO FIT COLUMNS
327
USER INTERACTIONS
333
335
337
343
EXTERNAL HTML PAGE LINK
TURN PAGE AS NEEDED
ZOOM TABLE AS NEEDED
ZOOM IMAGE AS NEEDED
245
CLOSE ALL WINDOWS

FIG. 6

SYSTEM FOR CONVERTING SCROLLING DISPLAY TO NON-SCROLLING COLUMNAR DISPLAY

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] This invention relates generally to a display control system and, more particularly without limitation, to a system for controlling the display on the screen of a computer monitor for the purpose of reducing eye strain of, and increasing readability for, a user.

[0003] 2. Description of the Related Art

[0004] Reading has never been a particularly natural task for the human eye, but scanning text on a computer screen appears to be especially more effortful than it is on a printed page. While the popular view of this phenomenon is that text on computers causes eye strain, it is more likely that text viewing generally increases the cognitive load on the user in a variety of ways. One of the main factors that may contribute to difficulty reading text on a computer screen has to do with document length. A common solution used to display long documents is to scroll the screen to bring more of the material into view. Prior art employs two scrolling strategies: screen-by-screen, line-by-line. The problem is that, however efficient these scrolling strategies are from an engineering standpoint, they may actually make the reading task more difficult for the user. The relevant issues encompass three key aspects of readability, namely reading speed, reading comprehension, and reading ease, each of which can be observed and measured as viewer performance variables. Content complexity can be considered a control variable, and should be used to distinguish effects among the three performance variables bearing on readability.

[0005] Users employ two strategies to move down through a long document, either to advance screen-by-screen or line-by-line, neither one of which is conducive to natural reading. Scrolling screen-by-screen is disruptive to the reading experience because it causes users to lose their place, forcing them to free cognitive resources away from text comprehension in order to reorient the eye in the proper location in the text. The other option is to scroll line-by-line, ensuring that only previously viewed material is removed from view, not new material. However, this imposes a control task on the reader that similarly drains cognitive resources away from the primary task of text comprehension.

[0006] Such strain is due in part to the sudden and repetitive vertical shifting of screen contents and the natural attempt by the human visual system to follow such apparent motions. It may also be due in part to a reduction of blinking, since the flicker caused by scrolling spoofs physical blinking. Continuous scrolling, by more or less constant vertical motion of screen contents, likewise subjects the viewer to strain due to finer, but more frequent, vertical steps and flicker. Furthermore, continuous scrolling rarely achieves real freedom from the distraction of display control; reading speed normally varies with content complexity, which may change substantially both within and between documents.

[0007] Thus, in choosing any of the commonly available scrolling strategies for consuming substantial reading material on-screen, the readability of the material is normally compromised. This happens either by disruptions in information flow, by distractions from the task of consuming and comprehending information, or by additional eye stress and fatigue. Fatigue may even foreshorten the consumption of significant amounts of readable material and affect comprehension.

[0008] Another problem with using a computer monitor for consuming readable material is that lines of text generally span from near one side of the monitor to the other. This may require substantial lateral eye movement for every line of text, which can cause user fatigue. Upon completion of reading one line of test, the human visual system generally retraces the line to find the beginning of the subsequent line of text. If the line of text is too long relative to its height, retrace errors can occur, disrupting the flow of information similarly to the incomplete scrolling problem previously described. Thus, readability is again compromised in reading ease and reading speed domains.

[0009] Prior art attempts to resolve this particular problem generally introduces either reduced-width columns or multiple columns of material on-screen. Reduced width columns are certainly more readable, having shorter lines that are more easily retraced. However, reduced width columns also result in more scrolling, since the area required to present the material is more or less fixed, and reducing the width merely increases the depth needed to be reached by scrolling. Multiple columns of material may also result in reduced column width. However, the typical presentation layout principle is to form columns with a sufficient depth to reach the bottom of the printable page, and is primarily suited for off-screen consumption. Alternatively, a presentation layout principle for on-screen consumption is to more or less balance the depth of the columns. In this case, the scrolling task is even greater; the viewer must scroll to the bottom of a column and then scroll completely back to the top of the subsequent column. Thus, these prior art attempts to manage column widths may actually result in additional losses to readability.

[0010] Another common problem is the use of inappropriate type fonts in presenting material onscreen. The publisher may make use of rather small fonts, which can crowd more information onto the screen at once, thereby reducing the amount of scrolling required for complete consumption of the presented information. This strategy generally results in additional eye strain, due to squinting or straining to read uncomfortably small print, and due to increased retrace errors caused by long narrow lines of text. Again, readability is compromised. The significance of type fonts as bearing on readability is dependent on individual viewers (visual acuity) and on their environment (external lighting and monitor quality). Individual response to eye strain, as caused by small fonts or repetitive vertical scrolling, may invoke symptoms of optokinetic nystagmus, which is an involuntary eye reflex further enhanced by eye strain, which may also negatively affect reading performance. Nystagmus may arise regardless of font selection, however, due to eye strain induced by scrolling alone. The viewing environment issues (external lighting and monitor quality) may be considered noise factors in measuring readability, requiring controlled experimentation and statistical analysis. The intent of the publisher of the document is, presumably, to present information appropriately by predetermined font selections. Due to individual viewer preferences and environment factors,

such intentions may well result in a higher rate of eye strain and reduced readability than normally considered or assumed.

[0011] Prior art often permits the viewer to adjust the size(s) of the type font used to render the document on-screen. The effort to discover and use methods to modify font size may discourage their use. More significantly, the presentation layout principles incorporated in the prior art are often inadequate to desirably fulfill viewer requirements to improve readability through font size modification. As an example, consider the implementation of multiple columns for a recent release of a web browser: the number of columns is prescribed by the web page author and cannot be modified by the viewer. As the viewer overrides the publisher's font selections in order to significantly enlarge font sizes for his own particular situation, the quality of the layout can be compromised. For instance, lines of text can easily contain too few characters, with large gaps for words that might preferably be hyphenated. In addition, there is a disproportionate increase in the rate of retracing and the amount of requisite scrolling. All this results in a substantial reduction in readability.

[0012] Similarly, when a person engages in reading a lengthy publication, a natural tendency is to settle back in the chair for comfort. When reading printed material, this is generally a well-supported activity; unless the publication itself is too heavy, the reading distance is easily maintained. For on-screen consumption of information, however, reading distance is not easily maintained even with laptop computers. Viewers could clearly benefit by simply increasing font sizes in proportion to the increased reading distances afforded by more comfortable sitting positions. However, the practical difficulties in accomplishing this simple goal with prior art are quite apparently rather significant. Font size modifications by the viewer, in and of themselves, are generally inadequate to enhance readability using the prior art.

[0013] Thus, what is needed is a system for enhancing the readability of on-screen presentations of information. Such a system would eliminate the need for scrolling. It would also limit the line widths of readable text to a useful range. It would also allow the viewer to easily modify font size and apply better presentation layout principles to preserve and enhance on-screen consumption of information.

SUMMARY OF THE INVENTION

[0014] An improved system is provided for on-screen publishing of documents, including combinations of text, graphics, and tables, to the consumer. The key features of this system include: precluding the use of window scrolling, to accommodate information too extensive to be displayed at one time, through the use of page-turning techniques; conforming this information to multiple columns to enhance readability; and integrating, in the multiple column layout on the on-screen presentation, font resizing operations conducted by the information consumer.

[0015] More specifically, an improved computer system is provided for automatically converting a scrollable electronic document, including text, graphics, tables and combinations thereof, from a scrollable format to a non-scrollable format, the system comprising a page-forming mechanism configured to operatively and automatically arrange the scrollable electronic information document into a plurality of non-scrollable pages, each having one or more columns wherein each of the columns has a width corresponding to a number of characters per line within a predetermined range of characters per line; a screen having a display window configured to simultaneously display a selected one of the plurality of non-scrollable pages in its entirety; and a page-turning mechanism configured to selectively, sequentially and individually display the plurality of non-scrollable pages in the display window. The page-forming mechanism may include a content formatter mechanism that is configured to be operatively responsive to formatting commands, either common word-processing commands or html commands or both, embedded in the electronic document. The page-forming mechanism includes a font-sizing mechanism configured to operatively permit a user to selectively alter the size of the characters comprising the non-scrollable pages. Also, the system includes an image sizing mechanism configured either to automatically alter the widths of graphic images and tables in the electronic document to proportionately conform to the width of the one or more columns, or to reduce the graphic images and tables to selectively expandable icons positioned in the displayed document.

[0016] Briefly, a first described embodiment of the present invention is configured to manipulate text utilizing common word-processing commands and graphics images embedded in a source document, whereas a modified embodiment thereof is configured to additionally manipulate tables and utilize html commands embedded in the source document.

[0017] A method is provided for practicing the invention.

PRINCIPAL OBJECTS AND ADVANTAGES OF THE INVENTION

[0018] The principal objects and advantages of the present invention include: providing a system and method for eliminating scrolling while viewing lengthy material on a monitor; providing such a system and method that establishes a maximum line width for text intended to be read by a user; providing such a system and method for permitting a user to selectively enlarge information printed in small fonts such that the material can be easily read while the user sits at a comfortable viewing distance from the monitor; providing such a system and method for automatically recalculating the number of displayed columns in response to a user change in size of displayed font; providing such a system and method for automatically reformatting displayed material in response to a user change in size of displayed font; providing such a system and method for automatically resizing graphics images embedded in a source document to fit within a column; providing such a system and method for automatically converting graphics images embedded in a source document to an icon or object image that is selectively expandable and reconvertable to the originally intended image; providing such a system and method for automatically resizing tables embedded in a source document to fit within a column; providing such a system and method for automatically converting tables embedded in a source document to an icon or object image that is selectively expandable and reconvertable to the originally intended table display; and generally providing such a system and method that is efficient in operation, reliable in performance, capable of long operating life, and is particularly well adapted for the proposed usage thereof.

[0019] Other objects and advantages of the present invention will become apparent from the following description taken in conjunction with the accompanying drawings, which constitute a part of this specification and wherein are set forth exemplary embodiments of the present invention to illustrate various objects and features thereof.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020] **FIG. 1** is a schematic representation of a display control system for converting a scrollable computer display to a non-scrollable columnar computer display, according to the present invention.

[0021] **FIG. 2** is a more detailed schematic representation of the display control system.

[0022] **FIG. 3** is a schematic representation of an application of the display control system, according to the present invention.

[0023] **FIG. 4** is a schematic representation of a modified embodiment of the display control system, according to the present invention.

[0024] **FIG. 5** is a more detailed schematic representation of the modified embodiment of the display control system.

[0025] **FIG. 6** is a schematic representation of an application of the modified embodiment of the display control system, according to the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0026] As required, detailed embodiments of the present invention are disclosed herein; however, it is to be understood that the disclosed embodiments are merely exemplary of the invention, which may be embodied in various forms. Therefore, specific structural and functional details disclosed herein are not to be interpreted as limiting, but merely as a basis for the claims and as a representative basis for teaching one skilled in the art to variously employ the present invention in virtually any appropriately detailed structure.

[0027] The reference numeral **1** generally refers to a display control system in accordance with the present invention, as shown in **FIGS. 1 through 3**. The system **1** generally comprises a screen **3**, a page-forming mechanism **5**, a resizing mechanism **7**, a screen-printing mechanism **13**, and paging means such as in the form of a page-turning mechanism **15**.

[0028] It is to be understood that the system **1** includes various software algorithms, commonly known to persons skilled in the programming art, which, in combination with each other and with various devices and components, also known to those having skill in the computer hardware and software arts, provide the various objectives and benefits of the present invention, as hereinafter described. A printout of the computer source code for realizing the objects and advantages of the system **1** is attached hereto as Appendix A, which is incorporated herein by reference.

[0029] The screen **3** generally includes a display window **17**, wherein the display window **17** may include the entire viewing area of the screen **3** or may include only a smaller, selected portion of the available viewing area of the screen **3**, as suggested in **FIG. 1**. It is to be understood that the screen **3** may be the displayable component of a cathode ray tube type of monitor, or may be any other type of monitor used for displaying information electronically.

[0030] First formatting means, such as in the form of a screen page formatting mechanism **23** of the page-forming mechanism **5**, is configured to form a screen page **27** dimensioned to fit within the viewing area of the display window **17** and to thereby limit the quantity of electronic information available for printing to the screen **3** to only enough electronic information which will fit within the viewing area of the display window **17**. In other words, the amount of information available for the screen **3** at any given time can be written in its entirety within the display window **17**, as hereinafter described.

[0031] The screen page formatting mechanism **23** is configured to automatically determine the manner in which electronic information, sometimes referred to herein as source document **33**, will be displayed in the display window **17**. The screen page formatting mechanism **23** automatically determines the display capabilities available within the display window **17**, such as number of pixels comprising a horizontal line of the display window **17**, for example. Generally, the system is preset to utilize a user-selected font, such as Times New Roman for example, and a user-selected font size, such as 12- or 14-point type or other desirable fontsize, sometimes referred to herein as the "base font", wherein the current base font is the font currently selected by the user for presentation of the document. It is to be understood that the font size is further adjustable in size by the user as hereinafter described.

[0032] The screen page formatting mechanism **23** includes column determining means, such as in the form of a column formatting mechanism **35**, that, after first determining the maximum number of columns **37** having certain desired width characteristics, is configured to automatically format the screen page **27** into that maximum number of columns **37**.

[0033] The system **1** also includes a font-sizing mechanism **43**, which allows the user to selectively increase the size of the selected font by progressively mouse-clicking on a designated font-size enlarging button **45**, or to selectively decrease the size of the selected font by progressively mouse-clicking on a corresponding font-size reducing button **47**. In addition, the system **1** may also be configured to enlarge the font size by keypressing the "up arrow button"**49** of a keyboard **50** of the system **1**, and reduce the font size by keypressing the "down arrow button"**51** of the keyboard **50**.

[0034] Alternately or additionally, the system **1** may include a font-size pull-down menu **53** or other suitable arrangement wherein a particular size of font may be directly selected without having to progressively enlarge or progressively reduce the font size with the font-size enlarging and reducing buttons **45** and **47**. Of course, any change in the size of the font may alter the maximum number of the columns **37** that can be displayed in the display window **17** while retaining desired width characteristics for the columns **37**. As a result and in response to a change in the font size, the screen page formatting mechanism **23** is configured to automatically recalculate the new maximum number of the columns **37** having the desired width characteristics that is

displayable in the display window **17**, and the column formatting mechanism **35** is configured to automatically reformat the screen page **27** accordingly.

[**0035**] Examples of computer code to implement the font changing means of the present invention include: interpreting activation of the font size enlarging and reducing buttons **45**, **47** as change-font-size changing commands shown in Appendix A, beginning at page 10, line 20; interpreting "up" and "down" arrow key presses of a keyboard of the computer system **4** as change-font-size commands shown in Appendix A, beginning at page 10, line 42; responding to user commands to step font size up or down shown in Appendix A, beginning at page 14, line 32; incrementing the base font size up or down by one index value shown in Appendix A, beginning at page 13, line 8; and setting base and footer fonts according to new current font size index shown in Appendix A, beginning at page 14, line 42.

[**0036**] Second formatting means, such as in the form of a display page formatting mechanism **25** of the page-forming mechanism **5**, includes a source resizing mechanism **63** configured to automatically enlarge or reduce, as appropriate, the size of the font of all text of the source document **33** to conform to the size of font selected by the font-sizing mechanism **43**, as hereinbefore described. The display page formatting mechanism **25** is further configured to automatically divide the scrollable source document **33** into a segmented display document **55**, each segment **57** comprising one of a plurality of sequential display pages **57**, each of which display pages **57** comprises only enough material from the source document **33** to partially or totally fill each of the columns **37** of the screen page **27**, as suggested by the portions designated by the numerals **59**, **60**, **61** in **FIG. 2**, as an example wherein the screen page **27** is formatted into three of the columns **37**. The display page formatting mechanism **25** may also be configured to be responsive to certain in-line commands in the source document **33**, such as paragraph indent, word wrap, and other common word-processing commands provided by popular word processing programs.

[**0037**] It is to be understood that formatting and segmenting of the display document **55** may or may not be a separate operation but, instead, may be conducted concurrently with the printing of a selected one of the display pages **57** to the screen page **27**, with the system **1** automatically tracking which portions **59**, **60**, **61** is currently printed or being printed to the display screen **17**, and which portions correspond to each of the other display pages **57**.

[**0038**] It is also to be understood that when the font-sizing mechanism **43** is activated to alter the font size as hereinbefore described, not only does the screen page formatting mechanism **23** automatically recalculate the physical width of the columns **37** to thereby maintain the desired number of characters per line within a desired range of characters per line and also automatically reformat the new number of columns **37** into the screen page **27**, the display page formatting mechanism **25** also automatically redetermines the specific text **59**, **60**, **61** of the source document **33** to be displayed in each of the columns **37** of each of the display pages **57**.

[**0039**] In other words, the display page formatting mechanism **25** re-segments the display document **55** into a new set of sequential display pages **57** until reaching the end of the text or graphics elements of the source document **33**. Again, each newly reformatted display page **57** contains only enough material to partially or totally fill the newly formatted columns **37** of the screen page **27**, including allowing for a newly determined number of the columns **37** resulting from the change in font size implemented by the font-sizing mechanism **43**.

[**0040**] The source resizing mechanism **63** may also include resizing means, such as in the form of an image resizing mechanism **65**, configured to automatically recognize and resize graphic images contained in the source document **33**. The image resizing mechanism **65** may be adapted to reduce the width of the graphic images to correspond to the width of the columns **37** in the screen page **27**. Alternately, the source resizing mechanism **63** may include icon forming means wherein the image resizing mechanism **65** may be configured to convert each of the graphic images contained in the source document **33** to a respective icon **75** and displaying each of the icons **75** in close proximity to text in the display document **55** that was positioned near the respective graphic image in the source document **33**. In that event, the source resizing mechanism **63** includes expanding means wherein the image resizing mechanism **65** is configured to automatically expand a selected graphic image to its originally intended display size by a simple command, such as mouse-clicking the respective icon **75** for example.

[**0041**] Displaying means, such as in the form of the screen printing mechanism **13**, is configured to print a selected one of the display pages **57** to the screen page **27** by methods commonly known in the related art.

[**0042**] The page-turning mechanism **15** is configured to individually and sequentially, either forwardly or backwardly, page through the display pages **57** such that all information of the source document **33** is selectively cycled, without scrolling, into the user's view on the screen **3**, a display page **57** at time. In other words, the page turning mechanism **15** is adapted to replace a currently displayed display page **57** with any previous or subsequent display page **57** of the display document **55** in response to a user request to display any such previous or subsequent display page **57**. By this arrangement, the system **1** eliminates the need to scroll information displayed in the display window **17** since the display area required to display the information contained in any selected display page **57** does not exceed the display area provided by the columns **37** of the screen page **27**.

[**0043**] In an application of the present invention, the screen page formatting mechanism **23** automatically determines the display capability of the display window **17** in which the information contained in the source document **33** is to be displayed. If the entire viewable area of the screen **3** is to be used for the display window **17**, then the screen page formatting mechanism **23** is configured to adapt the width and height characteristics of the screen page **27** to conform to the width and height characteristics of the viewable area of the screen **3**. Similarly, if the user, employing standard window sizing and placement methods appropriate to the user's computer system, desires to specify a width for the display window **17** that is smaller than the viewable width of the screen **3** and/or a height for the display window **17** that is smaller than the viewable height of the

screen **3**, then the screen page formatting mechanism **23** is configured to adapt the width and height characteristics of the screen page **27** to conform to the width and height characteristics of the user-desired display window **17**. By so limiting the dimensions of the screen page **27**, scrolling of information printed to the display window **17** is eliminated since the dimensions of the screen page **27** are fully disposed within the specified display window **17**. It is to be understood that the user may also desire to place the display window **17** at a selected position on the screen **3**, or from time to time change the location of the display window **17** on the screen **3**. In that event, the screen printing mechanism **13** is configured to operatively and correspondingly position the screen page **27** at the same identical location of the display window **17** on the screen **3**.

[**0044**] If desired, a small area may be selectively reserved as a footer or information area **80** along one edge of the display area for displaying information not necessarily contained in the source document **33**. Of course, the representative portions **59**, **60** and **61** must be adjusted accordingly. Thus, the screen page **27** has been formatted to non-scrollably display electronic information, as schematically indicated by "FORMAT DISPLAY"**103** in **FIG. 3**. An example of computer code for adjusting the dimensions of the screen page **27** to account for any displayed footer area is shown in Appendix A, beginning at page 14, line 56.

[**0045**] Next, the screen page formatting mechanism **23** of the system **1** is configured to automatically calculate the number of columns to comprise the screen page **27** by measuring the pixel width of the minimum standard line of text according to the current base font. By definition, a minimum standard line of text is comprised of a set of characters meaningfully representing the typical number of characters of text in a line of text considered to be at the short limit for comfortable reading. Generally, such a set of characters comprises a predetermined number of identical characters, such as thirty characters, more or less, with the identical characters being the lower case "n" character, or other suitable character of similar width, such short limit being well-known in the typesetting industry.

[**0046**] The system **1** then divides the pixel width of the display window **17** by the pixel width of the minimum standard line of text to calculate a proposed column number, the number of columns **37** assigned to be automatically formatted into the screen page **27** being either "one" or the proposed column number, whichever is greater. The screen page formatting mechanism **23** then formats the screen page **27** as an array of the columns **37**, utilizing various appearance features known in the art, wherein the array of the columns **37** consists of the assigned number of the columns **37** generally have uniform width, height and separation in the screen page **27**. An example of computer code for determining the number of the columns **27** for a standard range of characters per line given the width of the display window **17** is shown in Appendix A, beginning at page 25, line 8.

[**0047**] The system **1** is then ready to receive the source document **33**, including graphics images, as schematically indicated by "RECEIVE ELECTRONIC INFORMATION"**105** in **FIG. 3**. The resizing mechanism **63** then resizes all text of the source document **33** to the size of the base font, as schematically indicated by "RESIZE TEXT"**107** in **FIG. 3**. The system **1** resizes the text elements of the source document **33** by filling the columns **37** with text elements, printing the text to the display window **17** using the base font and size while being responsive to in-line formatting commands included in the text of the source document **33**, wherein the in-line formatting commands may consist of a subset of HTML tags, a subset of document formatting codes such as those provided by a word processor, or document layout specifications; breaking the lines by hyphenating words that are too long to be printed within the column width pursuant to the font metric imposed by the base font and in-line formatting rules of the system **1**, or breaking the lines on word boundaries in contiguous text elements, such as for paragraph and line break inclusions, either directly indicated by paragraph or break tags or indirectly indicated, such as by outline inclusions. Then, breaking the line filling at the end of individual text element segments, as indicated either by the inclusion of graphic elements, such as the icons **75**, or by the end of the source document **33**.

[**0048**] Further, the image resizing mechanism **65** converts graphics images of the source document **33** into icons **75** or images having width dimensions not greater than the width of the columns formatted in the screen page **27**, as schematically indicated by "RESIZE GRAPHICS"**113** in **FIG. 3**.

[**0049**] Resizing of a graphics image by the system **1** generally comprises: comparing the actual width of the graphic image with the available width of the column **37**. If the width dimension of the graphic image exceeds the width dimension of the column **37**, the width of the graphic image is proportionately reduced to fit within the width of the column **37**, the height also preferentially reduced by the same proportion; if the height dimension of the graphic image exceeds the height of the column **37** of the screen page **27**, the height of the graphic image is proportionately reduced to fit within the height of the column of the screen page **27**, the width also preferentially reduced by the same proportion. The graphics image is then rendered as an in-line graphic element and (i) placed immediately after any prior text elements in the current line of the current column **37** of the display page **57**, or (ii) if the width of the graphics image exceeds the remaining width of the current line of the current column **37** of the display page **57**, placed immediately below the current line of the current column **37** of the display page **57**, or (iii) if the height of the graphics image exceeds the remaining height of the current column **37** of the display page **57**, placed in the next column **37** of the display page **57**, or (iv) if the current column **37** is the last column **37** of the current display page **57**, retained for display in the first column **37** of the next succeeding display page **57**.

[**0050**] An example of computer code for downloading the original graphic images from a remote file, caching the graphic images, and returning the corresponding image object or icon **75** is shown in Appendix A, beginning at page 3, line 4.

[**0051**] It is to be understood that resizing of the text font and/or resizing of the graphics images of the source document **33** may or may not be a separate operation but, instead, may be conducted concurrently with the printing of a selected one of the display pages **57** to the screen page **27**.

[**0052**] Thus, the resized text, with the icons **75** appropriately positioned therein such that the text either stops above

each of the icons **75** and continues below each of the icons **75**, or, if desired, wraps around each of the icons **75**, is reformatted to essentially convert the source document **33** into the display document **55** with a width of one of the columns **37**. The display page formatting mechanism **25** then equivalently segments the display document **55** into a plurality of sequential display pages **57**, as schematically indicated by "SEGMENT ELECTRONIC INFORMATION INTO DISPLAY PAGES"**117** in **FIG. 3**.

[**0053**] Then, a selected one of the plurality of screen pages **57** is printed, either concurrently with the resizing or subsequently, to the display window **17** by the screen-printing mechanism **77**, as schematically indicated by "SCREEN PRINT TEXT AND GRAPHICS OF SELECTED DISPLAY PAGE"**123** in **FIG. 3**. Since the quantity of information from the source document **33** printed to the screen **3** at any given time is only enough to partially or totally fill the columns **37** of the screen page **27**, need for scrolling in order to see all of the information printed to the screen **3** is eliminated by the present invention. An example of computer code for printing a selected one of the display pages **57** to the display screen **17** using the current base font and the automatically calculated number of the columns **37** is shown in Appendix A, beginning at page 16, line 11. Also, an example of computer code for resizing text and graphics images and printing the current display page **57** line-by-line and word-by-word, hyphenating as needed, parsing tag-based formatting instructions for text, resizing graphics images to fit within column width, and returning end-of-tag indices is shown in Appendix A, beginning at page 18, line 3.

[**0054**] If desired, the user may selectively change the size of certain features of the displayed material. More specifically, one of the features selectively changeable by the user is the font size, as schematically indicated by "ALTER FONT SIZE"**125** in **FIG. 3**. If font size is changed, the screen page formatting mechanism **23** would be activated to reformat the screen page **27**, including recalculating the number of columns **37** to be included in such reformatting, and the display page formatting mechanism **25** would be activated to develop a new segmented display document **55** corresponding to the reformatted screen page **27**, as hereinbefore described. Generally, altering font size will cause the system **1** to automatically return to the display page **57** being printed to the screen page **27** to the first one of the plurality of sequential display pages **57**.

[**0055**] Additionally, the icons **75** may be activated to expand the underlying graphics images to disclose or enlarge those features of the source document **33**, as schematically indicated by "ALTER GRAPHICS SIZE"**127** in **FIG. 3**. Preferably, activating the icons **75** does not cause the system **1** to return to the first one of the plurality of sequential display pages **57** as when altering the font size.

[**0056**] After viewing the display page **57** being printed to the display window **17**, the user may proceed to the next sequential display page **57** or the immediately preceding display page **57** as desired by activating the page-turning mechanism **15**, such as selecting an appropriate pull-down menu, mouse-clicking a designated button, or other suitable arrangement, as schematically indicated by "SELECT NEW DISPLAY PAGE"**135** in **FIG. 3**. As a result, a corresponding one of the plurality of display pages **57** is printed to the screen page **27**, as schematically indicated by "SCREEN PRINT TEXT AND GRAPHICS OF NEWLY SELECTED PAGE"**137** in **FIG. 3**. Again, scrolling of the information displayed in the display window **17** is eliminated since the display area required to display the information contained in each display page **57** is not greater than the available display area provided by the columns **37** of the screen page **27**.

[**0057**] In other words, the system **1** may provide an expedited method for changing font size while maintaining readability by maintaining a standard number of characters per line, as follows: (i) changing font size steps by accepting user input for stepping base font size up or down, keyboard input (e.g. up or down arrow keys), or graphical user interface "button" elements **45**, **47**; (ii) limiting the range of base font sizes (e.g., 8-point to 96-point fonts), (iii) limiting user input to defined range of font sizes, or (iv) modifying the base font size. Then, maintaining readability by (i) recalculating the number of columns **37** for the displayed font size using the newly current base font size as hereinbefore described for calculating the number of columns **37** for the displayed font size, (ii) recomposing the screen page **27** in accordance with the recalculated number of columns **37** as hereinbefore described for composing the screen page **27** as an array of columns **34**; and (iii) resizing text and graphics in accordance with the recomposition of the screen page **27** as hereinbefore described for resizing of text elements and resizing of graphics images.

[**0058**] A modified embodiment of the display control system for converting a scrollable computer display to a non-scrollable columnar computer display, in accordance with the present invention, is shown in **FIGS. 4 through 6**, and is generally designated herein by the numeral **201**. A printout of the computer source code for realizing the objects and advantages of the modified embodiment **201** is attached hereto as Appendix B, which is incorporated herein by reference. The primary difference between the modified embodiment **201** and the embodiment **1** previously described herein in the adaption of the present invention to support the extensive range of document formatting syntax possible with standard HTML, by utilizing numerous specialized methods for formatting in accord therewith. Many of the characteristics of the modified embodiment **201** are substantially similar to those of the previously described embodiment **1** and will not be reiterated here in detail.

[**0059**] The system **201** generally comprises a screen **203** of a computer system **204**, a page-forming mechanism **205**, a display sizing mechanism **207**, and a page-turning mechanism **215**. The page-forming mechanism **205** includes a screen page formatting mechanism **223** and a display page formatting mechanism **225**. The screen page formatting mechanism **223** is configured to form a screen page **27** dimensioned to fit within a display window **217**.

[**0060**] The screen page formatting mechanism **223** is configured to automatically determine the manner in which a source document **233**, will be displayed in the display window **217**. The screen page formatting mechanism **223** includes a column formatting mechanism **235** that, after first determining the maximum number of columns **237** having certain desired width characteristics, is configured to automatically format the screen page **227** into that maximum number of the columns **237**.

[**0061**] The system **201** also includes a font-sizing mechanism **243**, which allows the user to selectively increase the

size of the selected font by progressively mouse-clicking on a designated font-size enlarging button **245**, or to selectively decrease the size of the selected font by progressively mouse-clicking on a corresponding font-size reducing button **247**. In addition, the system **1** may also be configured to recognize a keypress of the "up arrow button"**249** of a keyboard **250** of the system **201** as a command to enlarge the font size, and a keypress of the "down arrow button"**251** of the keyboard **250** as a command to reduce the size of the font.

[**0062**] Alternately or additionally, the system **1** may include a font-size pull-down menu **253** or other suitable arrangement wherein a particular size of font may be directly selected without having to progressively enlarge or progressively reduce the font size with the font-size enlarging and reducing buttons **245**, **247**, or the "up" and "down" arrow keys **249**, **251**. In response to a change in the font size, the screen page formatting mechanism **223** is configured to automatically recalculate the new maximum number of the columns **237** having the desired width characteristics that is displayable in the display window **217**, and the column formatting mechanism **235** is configured to automatically reformat the screen page **227** accordingly.

[**0063**] Examples of computer code for determining the number of the columns for a standard range of characters per line given the width of the display window is shown in Appendix B, beginning at page 30, line 69 and page 31, line 5; for determining the minimum value of the width of the standard range of characters per line given the current base font size is shown in Appendix B, beginning at page 49, line 41; for interpreting "up arrow" and "down arrow" key presses on the computer keyboard as change-font-size commands is shown in Appendix B, beginning at page 54, line 61; for interpreting activation of font increasing and font decreasing buttons as change-font-size commands is shown in Appendix B, beginning at page 52, lines 25 and 64; for responding to user commands for stepping font size up or down is shown in Appendix B, beginning at page 32, line 12 and page 54, line 8; for incrementing base font size up or down by one index value is shown in Appendix B, beginning at page 50, line 3; and for setting base font size to a new index value within certain font size limits is shown in Appendix B, beginning at page 48, line 50.

[**0064**] The display page formatting mechanism **225** includes a source resizing mechanism **263** configured to automatically enlarge or reduce, as appropriate, the size of the font of all text of the source document **233** to conform to the size of font selected by the font**4** sizing mechanism **243**, as hereinbefore described. The display page formatting mechanism **225** is further configured to automatically divide the scrollable source document **233** into a segmented display document **255**, each segment **257** thereof comprising one of a plurality of sequential display pages **257**, each of which display pages **257** comprises only enough material from the source document **233** to partially or totally fill each of the columns **237** of the screen page **227**, as suggested by the portions designated by the numerals **259**, **260**, **261** in **FIG. 5**, as an example wherein the screen page **227** is formatted into three of the columns **237**. The display page formatting mechanism **225** may also include a content formatter mechanism **262** that is configured to be operatively responsive to formatting commands embedded in the source document **233**, such as text color, style, font, font size, table and form specifications, etc., as well as paragraph indent, word wrap, and other common word-processing commands provided by popular word processing programs.

[**0065**] The source resizing mechanism **263** may also include an image resizing mechanism **265** and a table resizing mechanism **267** configured to automatically recognize and resize graphic images and tables, respectively, contained in the source document **233**. The image and table resizing mechanisms **265**, **267** may be adapted to reduce the width of the graphic images and the tables to correspond to the width of the columns **237** in the screen page **227**. Alternately, the image and table resizing mechanisms **265**, **267** may be configured to convert each of the graphic images and the tables contained in the source document **233** to a respective icon **275** and displaying each of the icons **275** in close proximity to text in the display document **255** that was positioned near the respective graphic image or table in the source document **233**. In that event, the image and table resizing mechanisms **265**, **267** are configured to automatically expand a selected graphic image or table to its originally intended display size by a simple command, such as mouse-clicking the respective icon **275** for example.

[**0066**] Resizing of a table by the system **201** generally comprises the steps of: rendering the table as an in-line element and (i) placing the table immediately after any prior text or graphic elements in the current line of the current column **237** of the display page **257**; or (ii) if the preferred width of the table exceeds the remaining width of the current line of the current column **237** of the display page **257**, placing the table immediately below the current line in the current column **237** of the display page **257**; or (iii) if the minimum height of the table exceeds the remaining height of the current column **237** of the display page **257**, placing the table in the next column **237** of the display page **257**, or (iv) if the current column **237** is the last column **237** of the current display page **257**, retaining the table for display in the first column **237** of the next succeeding display page **257**.

[**0067**] Rendering of the table by the system **201** comprises the steps of: (i) creating a grid array with an adequate number of rows and columns for the table specifications as determined by the source document **233** or other reference data; and (ii) filling the cells of the grid with the table entry data as specified by the source document **233** or other reference source, wherein the cells comprise resized text, graphics, and table elements adapted to the allocated dimensions of the cells.

[**0068**] The screen printing mechanism **213** is configured to print a selected one of the display pages **57** to the screen page **227**. Examples of computer code for printing a selected one of the display pages to the display screen using the current base font and the automatically calculated number of the columns is shown in Appendix B, beginning at page 43, lines 17, 36 and 48; for adjusting the dimensions of the screen page to account for any footer area displayed is shown in Appendix B, beginning at page 49, lines 8 and 17; for resizing of text elements and printing the current display page to the display screen is shown in Appendix B, beginning at page 38, line 16; for parsing html tag-based formatting instructions for text, graphics and tables, and returning end-of-tag indices is shown in Appendix B, beginning at page 24, line 64; for sending blocks of text to be drawn on

the display window including measuring text word-by-word, hyphenating as needed, adding words to be printed to a row of text and graphics, and returning a boolean when all words in the block of text have been handled is shown in Appendix B, beginning at page 23, line 29; for sending words to be drawn of the display table including converting html character entities if any, adding words to a cache for printing a row of text and graphics, and determining the width of the word is shown in Appendix B, beginning at page 30, line 9; for drawing lines composed of text, graphics, and table elements including accounting for heights, offsets and widths of all row elements, printing each to the display screen, adding Java components as required, and returning end-of-content indices is shown in Appendix B, beginning at page 40, line 17; for resizing graphics elements including downloading original graphic images from file, caching images for future use, and returning image objects or icons is shown in Appendix B, beginning at page 71, line 60; for accounting for column width and height to determine image scale-down factor if any, and returning widths of rendered images is shown in Appendix B, beginning at page 70, line 59; for rendering table elements including printing the table to the display screen is shown in Appendix B, beginning at page 88, line 4; for creating an array of rows and columns according to html table specifications is shown in Appendix B, beginning at page 84, line 23; for resizing tables to fit column width and height limits, and returning end-of-tag indices is shown in Appendix B, beginning at page 77, line 31; for setting base and footer fonts according to a new size index is shown in Appendix B, beginning at page 48, line 20; and for setting base font color and metrics is shown in Appendix B, beginning at page 48, lines 31 and 37.

[0069] The page-turning mechanism **215** is configured to individually and sequentially, either forwardly or backwardly, page through the display pages **257** such that all information of the source document **233** is selectively cycled, without scrolling, into the user's view on the screen **203**, a display page **257** at time.

[0070] In an application of the modified embodiment **201** of the present invention, a user connects to a host html page of a client system, as schematically indicated by "HOST HTML PAGE INVOKED BY USER"**303** in **FIG. 6**, and a selected document file, namely the source document **233**, is downloaded therethrough as schematically indicated by "DOCUMENT FILE DOWNLOAD"**305**. The system **201** is configured to parse the source document **233** and automatically determine the specialized Java class applets needed to render the source document **233** as schematically indicated by "FORMATTER CLASSES AS NEEDED"**307**. The appropriate applet classes are then accessed by the system **201**, either locally from the computer system **204** or downloaded through the html page, as schematically indicated by "APPLET CLASS DOWNLOAD"**313**.

[0071] The system **201** then, cooperatively with the downloaded applet classes, automatically formats the columns **237** as schematically indicated by "AUTOMATIC COLUMNS"**315**, and automatically scales graphics images and tables to fit the columns **237** as schematically indicated by "IMAGES SCALED TO FIT COLUMNS"**317**. The system **201** is configured to directly print a selected one of the display pages **255** to the columns **237** of the screen page **227** and, therefore, to the display screen **217**, as indicated schematically by "READER SCREEN"**323**, to form an applet display as schematically indicated by "APPLET DISPLAY"**325**, or a combination of the two.

[0072] The user may then selectively interact with the system **201** as schematically indicated by "USER INTERACTIONS"**327**, including making further connections through the html page as indicated by "EXTERNAL HTML PAGE LINK"**333**, selectively and individually viewing other display pages **257** of the display document **255** as schematically indicated by "TURN PAGE AS NEEDED"**335**, and enlarging a table or graphics image by mouse-clicking on the reduced display thereof or by mouse-clicking on the corresponding icon **275**, as appropriate, as schematically indicated by "ZOOM TABLE AS NEEDED"**337** and "ZOOM IMAGE AS NEEDED"**343** in **FIG. 6**. Of course, after completion of the exercise, the user causes the system **201** to "CLOSE ALL WINDOWS"**245**.

[0073] Summarizing, the present invention provides an expedited method for changing font size while maintaining readability by maintaining a standard number of characters per line, as follows: (i) changing font size steps by accepting user input for stepping base font size up or down, keyboard input (e.g. up or down arrow keys), or graphical user interface "button" elements; (ii) limiting the range of base font sizes (e.g., 8-point to 96-point fonts), (iii) limiting user input to defined range of font sizes, or (iv) modifying the base font size. Then, maintaining readability by (i) recalculating the number of columns for the displayed font size using the newly current base font size as hereinbefore described for calculating the number of columns based on the available display window width and the selected display font size, (ii) recomposing the screen page in accordance with the recalculated number of columns as hereinbefore described for composing the screen page as an array of columns; and (iii) resizing text, graphics, and tables in accordance with the recomposition of the screen page as hereinbefore described for resizing of text elements, resizing of graphics images, and resizing of tables.

[0074] In addition to the foregoing, other techniques may be used in combination therewith to further reduce eye strain of a user viewing a monitor utilizing the screen control display system. For example, background and desirable contrasting text, etc., colors may be selected including gray scales, as appropriate.

[0075] Simply stated, features provided by the present invention include the ability to pull up text, a graphic image or a table into its own separate window with a single mouse click on the selected material, and the appearance of the electronic information on the screen is document dependent instead of the appearance being software dependent, which allows a viewer to control and maintain the appearance of the document in a more readable form, regardless of how the author of the electronic information set up that document originally. These features, in combination, have the effect of reducing eye strain in on-monitor reading and viewing of text and graphics by measurably reducing optokinetic nystagmus and/or measurably reducing eye squinting.

[0076] It is to be understood that while certain forms of the present invention have been illustrated and described herein, it is not to be limited to the specific forms or arrangement of parts described and shown.

What is claimed and desired to be secured by Letters Patent is as follows:

1. A computer system for converting a scrollable source document into a page display document, the source document having information in the form of text, graphics, tables, or combinations thereof, which source document is too large to be fully displayable without scrolling on a display window of a screen associated with the system, the system comprising:

(a) first formatting means for automatically formatting a screen page that is fully displayable in the display window and comprises at least one column, each having a column width corresponding to a number of characters per line within a predetermined range of characters per line;

(b) second formatting means for automatically reformatting the source document to conform with said column width to form a display document comprising a plurality of sequential display pages; and

(c) displaying means for automatically filling said at least one column of the display window with a selected one of said plurality of display pages, each said display page being separately and fully displayable in the display window; and

(d) paging means for selectively paging, without scrolling, through said plurality of display pages.

2. The system according to claim 1, wherein said first formatting means includes column determining means for automatically determining the quantity of said at least one column comprising each said display page.

3. The system according to claim 2, further comprising said column determining means configured to automatically determine the actual width of said at least one column.

4. The system according to claim 1, wherein said second formatting means and said display means are configured to automatically utilize a user selected font for said plurality of display pages.

5. The system according to claim 1, wherein said second formatting means and said display means are configured to automatically utilize a user selected size of font for said plurality of display pages.

6. The system according to claim 1, wherein said second formatting means is responsive to in-line formatting commands included in the source document.

7. The system according to claim 5, including:

(a) font changing means for selectively changing the size of the font utilized for said plurality of display pages; and

(b) said first formatting means, responsive to said font changing means, being operable to reformat said screen page such that said at least one column maintains said column width within said predetermined range of characters per line.

8. The system according to claim 1, wherein said second formatting means further comprises resizing means for automatically resizing a graphic image or table included in the source document to fit within said at least one column.

9. The system according to claim 8, wherein said resizing means includes icon forming means for automatically displaying the graphic image or table as an icon in said at least one column in a respective one of said plurality of display pages.

10. The system according to claim 9, wherein said resizing means further includes expanding means for selectively displaying the graphic image or table in the size anticipated by the source document by mouse clicking respective said icon.

11. The system according to claim 10, wherein said resizing means is configured to automatically maintain the height-to-width ratio of the graphic image or table during said resizing and expanding.

12. A computer system for automatically converting a scrollable electronic document, including text, graphics, tables and combinations thereof, from a scrollable format to a non-scrollable format, the system comprising:

(a) a page-forming mechanism configured to operatively and automatically arrange the scrollable electronic information document into a plurality of non-scrollable pages, each having at least one column wherein each said column has a width corresponding to a number of characters per line within a predetermined range of characters per line;

(b) a screen having a display window configured to simultaneously display a selected one of said plurality of non-scrollable pages in its entirety; and

(c) a page-turning mechanism configured to selectively, sequentially and individually display said plurality of non-scrollable pages in said display window.

13. The system according to claim 12, wherein said page-forming mechanism includes a content formatter mechanism configured to be operatively responsive to formatting commands embedded in the electronic document.

14. The system according to claim 13, wherein said page-forming mechanism includes a font-sizing mechanism configured to operatively permit a user to selectively alter the size of the characters comprising said non-scrollable pages.

15. The system according to claim 12, further including an image sizing mechanism configured to automatically alter the widths of graphic images and tables in the electronic document to conform to the width of said at least one column.

16. The system according to claim 12, including an image sizing mechanism configured to automatically and proportionately alter the widths of graphic images and tables in the electronic information document to conform to the width of said at least one column.

17. The system according to claim 15, the means for reducing the size of a graphic image or table being operable to selectively display the graphic image or table in the size originally anticipated by the electronic information document.

18. A method for converting a scrollable source document into a page display document wherein the source document has information in the form of text, graphics, tables, or combinations thereof and wherein the source document is too large to be fully displayable without scrolling on a display window of a screen, the method comprising the steps of:

(a) automatically formatting a screen page that is fully displayable in the display window wherein said screen

page comprises at least one column, each having a column width corresponding to a number of characters per line within a predetermined range of characters per line;

(b) automatically reformatting the source document to conform with said column width to form a display document comprising a plurality of sequential display pages; and

(c) automatically filling said at least one column of the display window with a selected one of said plurality of display pages, each said display page being separately and fully displayable in the display window; and

(d) selectively paging, without scrolling, through said plurality of display pages.

19. The method according to claim 18, wherein said step of automatically formatting a screen page includes the step of automatically determining the quantity of said at least one column comprising each said display page.

20. The method according to claim 19, wherein said step of automatically formatting a screen page further includes automatically determining the actual width of each of said at least one column.

21. The method according to claim 18, wherein each of said step of automatically reformatting the source document and said step of automatically filling said at least one column includes automatically utilizing a user selected font for said plurality of display pages.

22. The method according to claim 18, wherein each of said step of automatically reformatting the source document and said step of automatically filling said at least one column includes automatically utilizing a user selected size of font for said plurality of display pages.

23. The method according to claim 18, wherein said step for automatically reformatting the source document includes automatically responding to in-line formatting commands included in the source document.

24. The method according to claim 22, further including the steps of:

(a) selectively changing the size of the font utilized for said plurality of display pages; and

(b) automatically reformatting said screen page such that said at least one column maintains said column width within said predetermined range of characters per line.

25. The method according to claim 18, wherein said step of automatically reformatting the source document includes automatically resizing a graphic image or table included in the source document to fit within said at least one column.

26. The method according to claim 25, wherein said step of automatically resizing a graphic image or table includes automatically displaying the graphic image or table as an icon in said at least one column in a respective one of said plurality of display pages.

27. The method according to claim 26, wherein said step of automatically resizing a graphic image or table further includes selectively expanding and displaying the graphic image or table in the size anticipated by the source document by mouse clicking respective said icon.

28. The method according to claim 27, wherein said step of automatically resizing a graphic image or table includes automatically maintaining the height-to-width ratio of the graphic image or table during said resizing and expanding.

29. A method for automatically converting a scrollable electronic document, including text, graphics, tables and combinations thereof, from a scrollable format to a non-scrollable format, the method comprising the steps of:

(a) automatically arranging the scrollable electronic information document into a plurality of non-scrollable pages, each having at least one column wherein each said column has a width corresponding to a number of characters per line within a predetermined range of characters per line based on a user selected font size;

(b) simultaneously displaying a selected one of said plurality of non-scrollable pages in its entirety; and

(c) selectively, sequentially and individually displaying said plurality of non-scrollable pages in said display window.

30. The method according to claim 29, wherein said step of automatically arranging the scrollable electronic document includes automatically responding to formatting commands embedded in the electronic document.

31. The method according to claim 30, wherein said step of automatically arranging the scrollable electronic document includes selectively altering the size of the characters comprising said non-scrollable pages.

32. The method according to claim 29, wherein the step of automatically arranging the scrolling electronic document includes automatically altering the widths of graphic images and tables in the electronic document to conform to the width of said at least one column.

33. The method according to claim 29, wherein the steps of automatically arranging the scrolling electronic document includes automatically and proportionately altering the widths of graphic images and tables in the electronic document to conform to the width of said at least one column.

34. The method according to claim 32, wherein the step of altering the widths of graphic images and tables includes selectively displaying the graphic image or table in the size originally anticipated by the electronic document.

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